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THE MORRIS ARBORETUM OF THE UNIVERSITY OF PENNSYLVANIA

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THE MORRIS ARBORETUM BULLETIN

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COVER: *Papaver somniferum* from Mattioli's *Commentaires*, Lyons, 1579. The garden poppy and its derivatives, opium and codeine, are mentioned in both "Alkaloids in Foods", page 11, and this issue's book review, page 15.

EDITOR: Hui-Lin Li ASSISTANT EDITOR: Susan B. Blum

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A VISIONARY VINE

FROM THE PERUVIAN AMAZON

by Marlene Dobkin de Rios
California State University, Fullerton

Plants possessing the power to create visions are as old as man himself. One such plant, a woody vine (*Banisteriopsis* ssp.), comes from the Amazon region of South America and was first recorded by botanists in the 19th century. Indian populations in this part of the world have used the plant for a variety of purposes ranging from healing psychological and emotional illness to establishing contact with the supernatural. Like other plant hallucinogens used in primitive society, *ayahuasca*, as the woody vine is called in Peru, is prepared and administered by an experienced botanist-healer-medicine man who gains his knowledge through long years of arduous apprenticeship.

Historically, the plant has been used by forest denizens both in horticultural and hunting societies of the tropical rain forest. Its use has not, however, diminished with the advent of the influence of the West, which includes industrialization and the growth of provincial cities and towns in the tropical rain forest. The city of Iquitos, Peru, is one area among many of the Amazon where, to all outward appearances, the 20th century has made an impression. Iquitos is today a city of about 120,000, a boom town in the wake of petroleum explorations. When I spent a year there in 1968 at the time of my fieldwork, Iquitos was a quiet, sleepy place. My research as an anthropologist was to find out about the use of this plant among so-called "civilized Indians."

Although some eighty years ago these men and women may have hunted, gathered, and planted tuberous crops along the river's edge, national institutions such as the military, a money economy, and Christianity have caused changes in their life style and beliefs. Groups of forest peasant migrants have been coming from small hamlets and villages to cities like Iquitos since the second World War in search of wage labor and better schooling for their children. Although their heritage stems from the primitive life style mentioned above, today they are Christianized, Spanish-speaking Peruvians. Yet in areas of culture, like the treatment of disease (especially psychological in nature), peasants in cities often choose to seek the services of an *ayahuasquero*—a man skilled in the old ways of using the plant hallucinogen.

I spent most of the year in Iquitos working in a river's edge slum called Belen (see photographs). Here many of the people had first hand familiarity with *ayahuasca*. I lived among the people as an anthropo-

Figure: *Banisteriopsis caapi* **courtesy of the Botanical Museum of Harvard University**

de Rios

A street scene in Belen, Iquitos, Peru.

logical participant observer, often going with patients to evening ritual sessions held in forest areas. An *ayahuasquero* and his patients would assemble several times a week and drink a tea prepared from boiling the vine several hours. *Ayahuasca* was often mixed with other hallucinogens, such as *Datura*, or with vines containing dimethyltryptamine, a powerful visionary substance on its own. Patients would be given a cup of the brew which the healer carefully measured out. He would then proceed to whistle time-honored melodies, blow tobacco smoke over each person, and occasionally suck away at afflicted, painful areas of the body.

People sought the services of an *ayahuasquero* out of fear of disease that they believed was caused by witchcraft—the evil malice of others who wished them harm. The daily life of peasants in cities around the world is often not very pleasant, as dire poverty and destitution can be constant companions. Such living can present the individual with stress and conflict in economic spheres that can lead to troubled psyches. When clinical medicine in the city's hospitals did not work, patients would often seek the help of a medicine man skilled in the use of *ayahuasca*. He could present them with a potent, emetic brew that had the power to induce fast-moving, colored visions. Unlike reports we read of the use of such substances in natural or synthetic form in the West, Amazonian peasants who take *ayahuasca* have certain expectations about their visions which they have learned from childhood on. If they believe that their illness is caused by the evil of others, the chances are high that their visions will contain a panorama of events leading up to their bewitchment and illness.

During the year that I lived in Iquitos I gathered data from many informants on the effects of plant hallucinogens like *ayahuasca*. As a foreigner, I was amazed at first with the recurrent reports of peoples' visions which led them to comprehend the origin of their illness. In most cases the disease was seen as due to their enemies paying a witch to cause them harm, or more infrequently, because they had offended a natural force or spirit entity.

continued page 16

de Rios

Maria, an apprentice *ayahuasquero*, preparing *masato*, a fermented beverage made from a tuber.

THE DEVELOPMENT OF HORTICULTURE IN AMERICA

by John M. Fogg, Jr.

Director, The Arboretum of the Barnes Foundation

Based on a talk given April 3, 1973, on the occasion of the Hundredth Anniversary of the Germantown Horticultural Society.

Any comprehensive treatment of the development of horticulture in America must take us back nearly three centuries and should give due consideration to the importance of Philadelphia as a botanical and horticultural center.

It was in 1694 that a sect of German Pietists, presided over by Kelpuis, established on the banks of the lower Wissahickon Creek a garden where medicinal plants were raised for use and study. Although no longer in existence and its exact location unknown, it may be considered the first botanical garden in America.

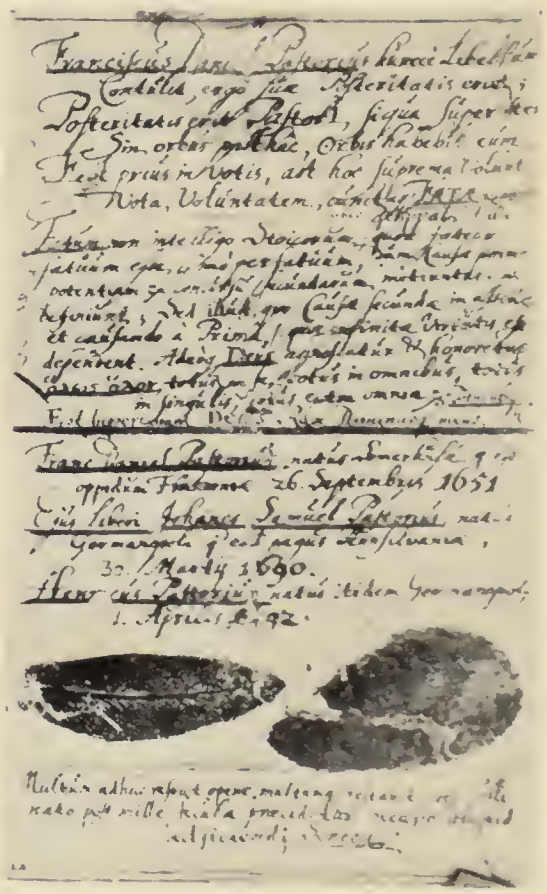
Francis Daniel Pastorius, the Founder of Germantown, who died in 1719, was botanist, gardener, linguist and poet. He was the author of "Medicus Dilectus," a discussion of the medicinal herbs of Pennsylvania and elsewhere, and of "Hortensis Deliciae," written in English, German, French, Latin and Dutch, which contains rhymes about the rare plants grown in his garden.

James Logan, whose homestead was close to Germantown Avenue at Stenton, had come to this country with William Penn, and later became Lieutenant-Governor of the colony of Pennsylvania. Experiments which he carried on in his garden with maize clearly demonstrated the role of sexuality in plants.

Christopher de Witt, an Englishman by birth, came to this country in 1704 and settled in Germantown. His garden was on the site now occupied by Germantown High School, as is proclaimed by a bronze plaque at the corner of Germantown Avenue and High Street. In addition to being a botanist, de Witt was a theosophist, mystic, Rosicrucian and physician. It is stated by the late Charles Jenkins that he sent a specimen of our eastern hemlock (*Tsuga canadensis*) to Peter Collinson in London prior to 1730. This was one of the first introductions of an American tree into Europe.

Although Stenton mansion still stands, all of these early gardens are gone. There is, however, one notable exception and this is the garden that Philadelphia's own John Bartram established on the banks of the Schuylkill River in 1731. Although Bartram was primarily a farmer, and apparently a very good one, he possessed many of the attributes of a naturalist. Among his early friends were Christopher de Witt, James Logan and Benjamin Franklin. Thanks to another friend, Joseph Breitnall, Bartram was put in touch with Peter Collinson, a London wool merchant, who commissioned him to collect seeds of American plants and it was through Collinson that Bartram also became a collector of American plants for Dr. John Fothergill.

Later Bartram came to know Peter Kahm, a student of Linnaeus, who visited Philadelphia in the 1740's, as well as Cadwalader Colden (Governor of New York), Alexander Garden (for whom *Gardenia* is named) and many others. His foreign correspondents included Sir Hans Sloane (who wrote the first account of the flora of the West Indies), Philip Miller (the director of the Chelsea Physic Garden in London), J.F. Gronovius (a distinguished Dutch botanist), and, above all, Carl Linnaeus of Sweden, the father of modern botany.



Title page of Pastorius's "Medicus Dilectus."

In 1765 John Bartram was appointed Botanist to King George III at an annual stipend of 50 pounds. He was then 66 years of age. It was in October of this same year that he and his son Billy discovered the Franklin tree on the banks of the Altamaha River near Fort Bennington, Georgia.

This is not the place to recount the details of John Bartram's journeys, which took him from upper New York state down through the Carolinas and Georgia to Florida. Suffice it to say that as a result of some forty years of traveling through largely uncharted wilderness this simple Philadelphia farmer sent between 150 and 200 species of American plants to his friends across the Atlantic.

At the same time that Bartram was dispatching plants to Europe he was growing them in his own garden and making them available to American horticulture. Had he done nothing more than introduce *Franklinia* into cultivation, he would certainly be entitled to a niche in Horticulture's "Hall of Fame." But there were others—many, many others—far too numerous to enumerate here in full. They included the star anise (*Illicium floridanum*), the silver-bell (*Halesia*), the Carolina allspice (*Calycanthus*), the fringe-tree (*Chionanthus virginicus*) and the beautiful southern evergreen rhododendron (*R. catawbiense*). Bartram's garden was the first repository of its kind in the New World and the debt which both European and American horticulture owe to it is incalculable.

Another Philadelphia collector and seedsman, whose birth-date is unknown but who died in 1785, was William Young, Jr. who sold American plants and seeds to dealers in the Old World. His "Catalogue," published in Paris in 1783, was one of the first listings of American plants available to horticulturists.

Kerper Studios

Stenton Mansion

Humphrey Marshall, who was a cousin of John Bartram, established in 1773 what was probably the first arboretum in the New World at Marshallton, in Chester County, Pa. In it he sought to grow all trees and shrubs, both native and exotic, hardy in this area and from it in 1785 he wrote his "American Grove" (Arbustum Americanum), probably the first indigenous treatise on botany published by an American.

One might well wish that Adam Kuhn, who was born in Germantown in 1741, and who studied under the illustrious Linnaeus in Uppsala, might have made a significant contribution to botany and horticulture. Alas, although apparently the first Professor of Botany in America (at the University of Pennsylvania, then the College of Philadelphia) Kuhn failed completely to fulfill the promise entertained for him by his preceptor.

Among those who contributed greatly to the advancement of horticulture in the New World were the Michaux's, Andre the father, and Francois Andre, the son.

It was the father who is said to have sent back to France some 60,000 specimens of American trees, only a few of which arrived in a living state. He is best known for his studies of the oaks of America, many of which he described for the first time.

The son traveled widely in the eastern United States, from Maine to Georgia and in 1817-19 there appeared his three volume "North American Sylva," a work which exerted considerable influence on the study of arboriculture in eastern North America.

In the meantime, William Hamilton had become the owner of a large estate known as "The Woodlands" in West Philadelphia. He is credited with having introduced the first Lombardy poplar (*Populus nigra italica*) to this country in 1784. His grounds were reputed to contain one of the finest collections of native and exotic plants to be found outside the gardens of Europe.

Even more significant was the patronage which he extended to two young botanists from abroad. John Lyon, a Scotsman, was employed by Hamilton in 1796 or 1797. Upon leaving "The Woodlands" he traveled widely through the southeastern states and in 1803 his journal records that he found six or eight plants of *Franklinia* on the spot where Bartram had discovered it nearly forty years before. Lyon was therefore apparently the last person to see the Franklin tree in its native state.

The plants which Lyon collected were established in several nurseries preparatory to their shipment abroad. One of these was the firm of David Landreth which had established a nursery in Philadelphia in 1784. The catalog which Lyon prepared of his offerings consisted of thirty-four pages.

Hamilton also assisted Frederick Pursh, the author of the first comprehensive "Flora of North America", published in 1814. It was Pursh whom Thomas Jefferson wished to appoint as botanist to the Lewis and Clark expedition in 1804, but the young explorer was off in the Country of the Five Nations and could not be reached.

It will be apparent from all of this that American botany had its roots very largely in horticulture. The demand for novelties from the New World for European gardens not only stimulated the activities of the collectors we have mentioned (and many more), but led to the establishment of nurseries and seed houses. In addition to Landreth's there were in the Philadelphia area the famous firms of Bernard M'Mahon, Thomas Meehan, Robert Buist and Anthony Waterer. Prince's Nursery was perhaps the first on Long Island and was followed by Parmentiers, Parsons and Hicks.

It will be noted, also, that up until the early years of the nineteenth century the flow of plant materials across the Atlantic was mostly from west to east. Naturally, some of the early settlers brought with them plants with which they were familiar, either as fruits, medicinals or ornamentals. And with the opening up of great estates there was a demand for material from Europe. This was largely supplied by English nurseries which specialized in native species or were in a position to propagate and offer plants from the Orient. Kaempfer, Thunberg and Siebold had visited Japan and sent home plants collected largely in gardens. Cunningham, D'Incarville, Osbeck, John Reeves, William Kerr and Robert Fortune had traveled sparingly in China and had enriched European gardens with their finds.

The invention in 1834 of the Wardian Case had greatly facilitated the shipment of living plants, which were no longer at the mercy of sailors who treated them with neglect, if not contempt.

In 1853 the United States dispatched an expedition to Japan under Commodore Perry. The naturalist on this mission was James Morrow, who had taken his degree in medicine at the University of Pennsylvania. Morrow took with him a shipment of plants from Buist's nursery and in return was instructed to bring back seeds and plants for experimentation from China and Japan. Although he encountered hostility from the natives, who on several occasions boiled seeds before delivering them to him, he succeeded in introducing seeds of such economic plants as melons, rice and wheat, as well as a few ornamental species.

It remained, however, for George Hall, an American physician, to introduce any appreciable number of ornamental plants from the Far East directly into the United States. Hall visited Japan in 1861 and 1862 and spent almost fifteen years in China. Many of his finds were deposited at Parson's nursery on Long Island, others were sent to Francis Parkman in Boston. Some of them, however,

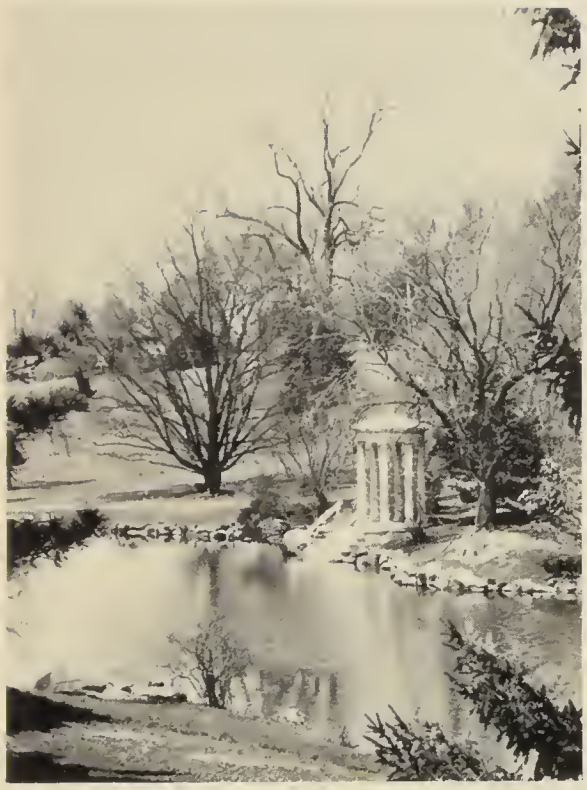
The home of John Bartram.

Fogg

"Woodlands", the estate of William Hamilton, today is a cemetary in West Philadelphia.

found their way into one or more of the Philadelphia nurseries mentioned above. Among his introductions were *Magnolia stellata* and *M. Kobus* (both from Japan), *Malus Halliana*, *Wisteria floribunda*, *Hydrangea paniculata* and *Lilium auratum*.

Although Philadelphia was no longer at dead center, it was still very much in the inner circle of horticultural activities in the United States.



A view of the Swan Pond at Morris Arboretum.

In 1872, a year prior to the founding of the Germantown Horticultural Society, there occurred an event of great significance to those who were concerned with the growing of trees and shrubs. This was the establishment of the Arnold Arboretum of Harvard University, made possible by a bequest in the estate of James Arnold. Charles Sprague Sargent was appointed Director in 1873 and retained this position until his death in 1927.

In 1874 Dr. Sargent went abroad to investigate sources of supply for plant material and, according to Dr. Donald Wyman, within a year the Arnold Arboretum received 56 plants and 264 packets of seeds from Great Britain and 307 plants and 1620 packets of seeds from Europe.

During the slightly more than one hundred years of its existence the Arnold Arboretum has not only supported plant collecting expeditions in distant lands, but has been extremely generous in distributing material to other arboreta as well as to nurseries.

Sargent had encouraged the Russian botanist, E.V. Bretschneider, to send plants from China to the Arboretum and in 1892 he himself journeyed to Japan and brought home seeds of many interesting plants from the northern portion of Honshu (Nippon) and the north island of Hokkaido.

However, the brightest jewel in the Arboretum's crown was E.H. Wilson, who had begun his career as a collector for the distinguished English firm of Veitch & Son, but in 1909 had joined the staff of the Arnold. On its behalf he explored and collected plants in China, Japan, Korea and Taiwan. It has been estimated that the number of species which he introduced into cultivation was approximately one thousand. This number contained, among many prized ornamentals, the renowned dove-tree, *Davidia involucrata*, the beauty bush (*Kolkwitzia*) and the regal lily (*Lilium regale*).

In the meantime, events had been taking place in other sections of the country, among them the Philadelphia area.

As early as 1800 the Peirce Arboretum, which was later to become Longwood Gardens, was established at Kennett Square, Pa. Sometime between 1825 and 1830 two Quaker brothers by the name of Painter had begun to assemble a collection of hardy native and exotic trees and shrubs on the grounds of their property at Lima, Pa. Today this is known as the Tyler Arboretum.

In 1887 Mr. John T. Morris acquired a parcel of land in Chestnut Hill, Philadelphia. Mr. Morris became friendly with Dr. Sargent and made contributions to the work of the Arnold Arboretum. As a result he became the recipient of many of the novelties acquired from the explorations of Wilson and others. Mr. Morris died in 1915, but was survived by his sister, Miss Lydia T. Morris. Upon her death in 1932 the property was left to the University of Pennsylvania and has since been known as the Morris Arboretum.

When the late Albert C. Barnes purchased a 13-acre property in Merion, Pa. in the early 1920's, for the purpose of constructing a building to house his art collection, he turned the development of the grounds over to his wife, Laura L. Barnes. The result of her imaginative planning and planting is the institution that is now the Arboretum of The Barnes Foundation.

On the campus of Swarthmore College, in the suburb of that name, there came into being, in 1929, the Arthur Hoyt Scott Arboretum, presided over for many years by its first director, Dr. John C. Wister.

Add to this the Taylor Arboretum at Chester, Swiss Pines Park, and the Bowman's Hill Wild Flower Preserve, and it will readily be apparent that the Philadelphia area must still be considered a mecca for everyone interested in horticulture.

Certainly no account, however sketchy, of the development of horticulture in the New World would be complete without reference to Liberty Hyde Bailey, who was born in 1858, and lived to be ninety-one, almost a century in one man. Dr. Bailey was the author not only of our standard "Cyclopedia of Horticulture," but also of the very useful "Manual of Cultivated Plants," the second edition of which appeared in 1949. A keen student not only of palms, but of such difficult genera as Carex and Rubus, L.H. Bailey stood head and shoulders above his contemporaries.

If I have failed to describe the achievements of such explorers and collectors as J.G. Jack, J.F. Rock, Frank Meyer and David Fairchield, it is simply because time permits only the briefest mention of those who have contributed so many of the plants which we take for granted in our gardens.

The Pennsylvania Horticultural Society was founded in 1827 and shortly thereafter sponsored the first Philadelphia Flower Show. It was at this event that the Poinsettia, collected in Mexico by Joel Poinsett of Greensboro, South Carolina, made its debut.

Perhaps the full dimension of present-day horticulture can best be appreciated by considering its international character. The First International Horticultural Congress was held in Brussels in 1864. Ninety-eight years later, in 1962, the Sixteenth Congress took place in the same city, and four years after that the Seventeenth convened at the University of Maryland in College Park.

The Maryland Congress, the first one to take place in the United States, was sponsored by the American Horticultural Society, the American Society for Horticultural Science, and the International Society for Horticultural Science, in cooperation with the American Institute of Biological Sciences. I mention these agencies merely to indicate the tremendous scope of modern horticulture.

At this Congress there were registrants from fifty countries including Finland, Ghana, Indonesia, Sudan and Tunisia. More than 700 papers were presented, necessitating the fractionating of the program into a score or more of sectional sessions with such headings as Fruit Breeding, Vegetable Breeding, Woody Plant Hardiness, Ornamental Plant Hardiness, Nutrition, Viruses, Flower Crops, Growth Regulators, Photoperiodism, Weeds and Weed Control, Water Relations, Seeds and Seedage, Mechanical Harvesting, Tropical Plants, Sub-arctic Horticulture and so on.

As Philadelphia considers its role in the forthcoming celebration of this nation's two hundredth anniversary it is to be hoped that appropriate emphasis will be devoted to this city's vitally important contribution to the origins and growth of botany and horticulture in America.

The Seal of the Germantown Horticultural Society

shrub profiles

Koller

COMPACT FORSYTHIAS

by Gary Koller

The sun brightens and, as the earth warms, spots of yellow forsythia appear announcing the return of spring. While we are all conscious of forsythia's bright yellow blossoms and the uplift they provide, many people feel that this plant has been overused in the landscape. Popularity results from its easy culture, the early season of bloom and its availability in the nursery trade.

Many people find the spring flowers attractive but, as the plant offers little ornamental value during other seasons, feel that the plant occupies more space than it is worth. Also, as property dimensions shrink we need to take more advantage of our limited space.

Compact forsythias have been introduced providing this garden favorite with a new shape and new uses. *Forsythia* 'Arnold Dwarf', with an ultimate height of three to four feet, originated at the Arnold Arboretum and was introduced in 1941. Because branches root wherever they touch the soil this plant makes a perfect ground cover.

Small, greenish yellow flowers occur very sparingly and as a result the Arnold Dwarf Forsythia is not recommended for floral production. However, because it roots easily, spreads rapidly forming a dense carpet, and holds the soil, it makes an ideal cover for difficult areas such as rocky banks.

Abundant, primrose yellow flowers appear each spring on Bronx Forsythia (*Forsythia viridissima* 'Bronxensis'). Large bell shaped flowers are borne either solitary or in clusters of three. The light green leaves are 1-1½ inch long and ½ inch wide.

Erect inner branches give the plant an ultimate height of two feet and spreading outer branches eventually cover two feet. Unlike Arnold Dwarf Forsythia, branches do not root where they touch the ground. Nurserymen have reported that this plant is slow to start upon transplanting but, once established, is free flowering.

Individually, the Bronx Forsythia is an ideal flowering shrub; or it can be used in mass as a ground cover. It is a perfect foreground plant for *Rhododendron mucronulatum* which blooms at the same time producing pale rosy purple flowers. Other companion plants might include lavender crocuses or King Alfred daffodils. Because of its good performance and adaptability, Bronx Forsythia will soon be represented in the landscape revision around Gates Hall.

Both forsythias are tolerant of a wide range of soils, sun to light shade, and the urban environment. Bronx Forsythia does require full sun for best floral production, and both require good drainage. Growth is rapid once established.

As with all forsythias, flowering occurs on wood produced the previous year and because of this any pruning should be done immediately after flowering. These long-lived, pest-free plants are very adaptable and make handsome additions in smaller landscape spaces.

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ALKALOIDS IN FOODS

by J. J. Willaman

Alkaloids are a looscly defined group of nitrogenous compounds found in various parts of plants throughout the plant world. Since most of thc alkaloids have some, and in many cases marked, non-nutritive physiological action when introduced into animals we would not expect to find them in food plants, but there are some instances of it. In most cases the contained alkaloids are innocuous and in small amounts. Exceptions to this are the occurrence of the ergot alkaloids in rye flour in such intensity as to cause epidemics of ergotism. Another case is the large and important group of beverages containing caffeine—tea, coffee and maté—and cocoa and its theobromine.

Nature and History of Alkaloids

Alkaloids cannot be defined with any degree of precision. They are organic compounds containing nitrogen; most of them react as bases; they occur almost without exception in plants, but they have no known function there. They are generally active physiologically in the animal body. Some familiar alkaloids are nicotine, strychnine, caffein, quinine, and codeine. Some 4000 of them are known and scores of new ones are found each year. They occur in over 7000 species of plants. Chemically they are of extremely diverse natures; their molecules contain from 5 to over 40 carbon atoms, from one to ten nitrogen atoms, usually oxygen, always hydrogen. A few have sulfur, one has phosphorus. They can be classified into about fourtcen types according to their contained characteristic chemical group, such as indole, pyridine, tropane, isoquinoline.

When chemistry began to be applicd to the composition of plants attention at first was dirccted to those plants which had obvious drug action of some sort. By 1840, eighteen alkaloids had been isolated and named and their pharmacological properties measured. Subsequently the plant world was explored for more alkaloids or more sources for those already at hand. Obviously the plants used for food and feed did not appear promising in this respect, and it was not until well into the twentieth century—when there was timc, opportunity and urge to discover what chemical substances were in all plants—that many of the food plants were examined.

Occurrence in Food Plants

Most of the alkaloids in food plants are innocuous, of low physiological activity when introduced into animals, and in general of too low a concentration in food plants to be significant. Most of the highly active ones are in tobacco and betclnuts, with some in khat, in rye grain infected with the ergot fungus, and at times in potato tubers. The first two are not foods, of course, but are included here because they are chewed and in some degree their extractives are swallowed, and becausc they are chewed for the physiological effects of their alkaloids. Khat contains the active alkaloid, ephcdrine. Khat is a tea in the Arab world, but it is also chewed and ultimately swallowed throughout eastern Africa, when it indeed bccomcs a food.

This discussion dcals only with the plant part which is caten and which contains the alkaloid. There arc many instanccs whcre another part of the same plant may be free of alkaloid. A few examples of this arc avocado, with alkaloid in the leaf but not in the fruit; the custard applcs, with alkaloids in the seed but not in the edible part of the fruit; the dandelion, with alkaloid in thc seed but not in the leaf.

Nature of These Alkaloids

On the following page is a concise statement of the pharmacology of some of the alkaloids in foods.

Some of the ALKALOIDS OF BETELNUTS have pharmacological properties. They are even narcotics, but the betel habit is not considered harmful. It gives the user a sense of well-being even under long continued and arduous labor. Some 200,000,000 people use betelnuts. The method is to smear a fresh leaf of the betel pepper (*Piper betle*) with quicklime, place on it slices of the betelnut (*Areca catechu*), green or ripe, roll into a ball and hold in the mouth (1).

coffee

CAFFEINE is well known. The average cup of coffee or tea contains 100 to 150 milligrams of it and a 12 ounce bottle of a cola drink has 35 to 55 milligrams. And since coffee is drunk by about a third of the world's population and tea by about a half, the daily consumption of caffeine is a whopping figure. It is obtained from the seeds of the coffee tree (*Coffea arabica*), leaves of tea (*camellia sinensis*) and the nuts of *Cola acuminata*. Minor alkaloids are theobromine in *Cola*, theophylline in tea. Mate (*Ilex paraguariensis*), the tea of the South Americans, contains all three of these alkaloids plus trigonelline (2, 3, 10 5:138).

CARPAINE shows some inhibition to the tuberculosis organism (4).

CHAVICINE is an isomeride of piperine and both contribute pungency to black pepper (5).

EPHEDRINE is the characteristic alkaloid of the ephedra plants. It is used in medicine as an agent in allergic disorders, for stimulation of the central nervous system and for treatment of hypotension. It is probable that users of khat—and there are millions of them in the Arab and Ethiopian world—either as a tea or a masticatory, derive comfort from the contained ephedrine (1).

ERGOTHIONEINE is one of the ergot alkaloids, where it is of fungal origin. But it is one of the very few plant alkaloids that occur also in animals—in this case in blood, liver and kidney (6).

GRAMINE partially blocks contraction of the uterus, but is in low concentration in European yellow lupine (7).

LUPANINE and LUPININE are mild uterine stimulants (8, v. 5). As to the seed of the white lupine, in some cases, at least, the content of toxic alkaloids is reduced in processing for public use. In the case of the yellow and blue lupines, Mironenko found that supplying adequate molybdenum and boron to the soil resulted in decreased alkaloid in the seed (11).

PHENETHYLAMINE in experiments with cats proved hypertensive in low dosages but hypotensive in high (8 v. 5).

PIPERINE is largely known as the pungent acid amide in black and white peppers and in the long pepper (5).

ERGOT is the blackened seed head of rye grain caused by the fungus *Claviceps purpurea*. It contains more than 50 alkaloids, probably all of them poisonous to humans, some of them highly so. Chronic poisoning has occurred among whole populations from eating infected rye flour. There were serious epidemics in 944 and 1090 A.D. and again as late as 1916 in Lorraine and Burgundy. Careful inspection of the grain can avoid trouble, but harvest workers still are affected temporarily. The most important of the ergot alkaloids are ergonovine, ergotamine and ergotoxine. They are used in medicine to induce contraction of the muscles of the uterus in child birth.

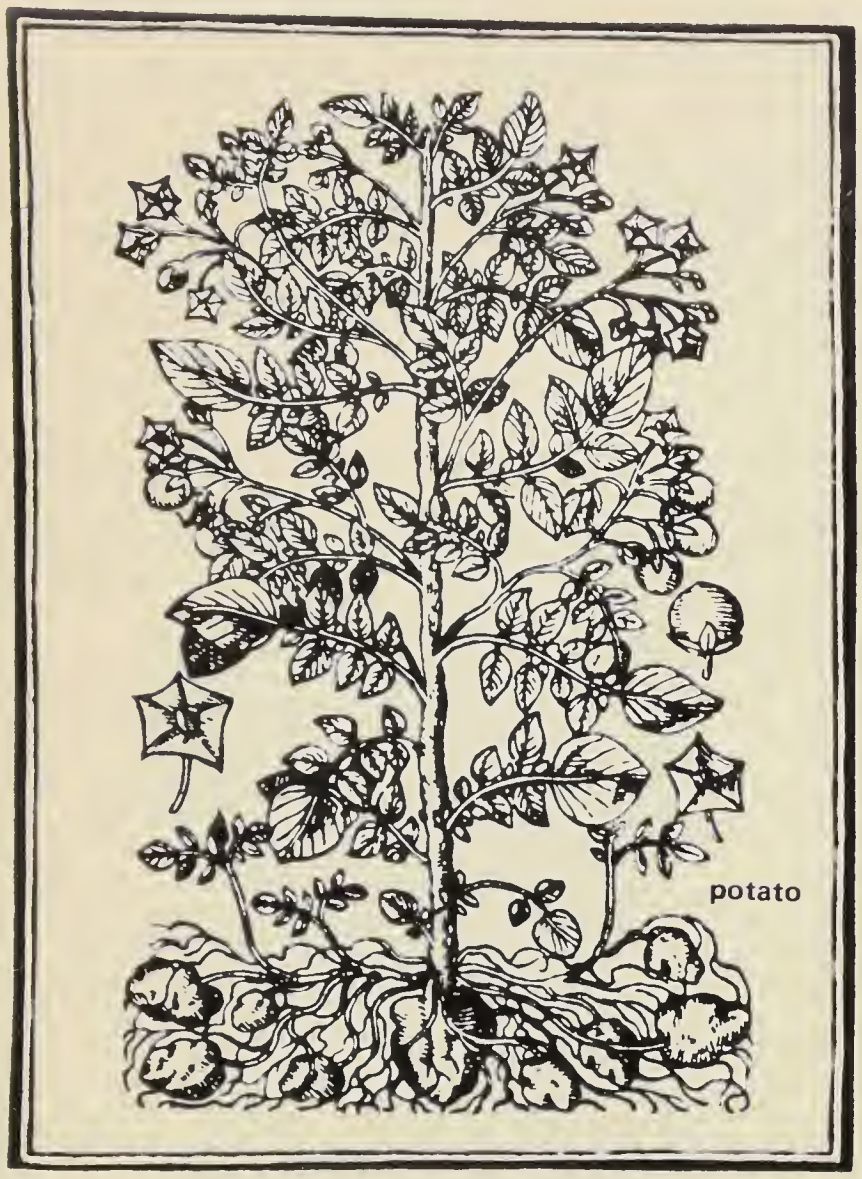
STACHYDRINE has such a low toxicity that its presence in rice is insignificant.

TAXINE proved lethal in experiments on rabbits at 2 to 3 milligrams per kilo, due to cardiac and respiratory failure. However, yew fruits are seldom eaten and not in quantity. Taxine also occurs in the leaf and stem of the yew tree, from which farm animals sometimes get harmful amounts (5).

The six ALKALOIDS OF POPPY SEED are all pharmacologically active (e.g., morphine and codeine) but are in such low concentration and the seeds are eaten in such small amounts that there is no danger in eating this condiment. Poppy seed oil contains no opium alkaloids (6).

Most of the more abundant ALKALOIDS OF TOBACCO are highly toxic. For example, 40 milligrams of nicotine is fatal to man. But in the use of chewing tobacco and snuff the ingestion is so slow and small that the physiological effects are mild. Nicotine is the most toxic, followed by anabasine, myosine and nicotyrine (5, 6).

TRIGONELLINE is wide spread in the plant kingdom but it has no marked pharmacological action.



SOLANIDINE occurs in potato tubers mostly as the glycoside *solanine*. Normally its concentration is about 2 to 10 milligrams per 100 grams fresh weight, largely in the peel. It increases with sprouting and with exposure of the tubers to the sun. The concentration may rise sufficiently to cause epidemics of severe gastroenteritis. In an epidemic in Germany in 1922 suspected tubers contained 25 to 58 milligrams per gram (9). Recently a newly developed variety of potato called B5141-6, when sampled across Canada, showed an unusually high content of glycoalkaloid (solanidine plus chaconine), greater than 20 milligrams per gram. These levels were not the result of sun or sprouting, but were reached even before detachment of the tuber from the plant. These facts were noted before public harm could result (12).

Significance

From the above it may be concluded that in plant foods alkaloids are of minor importance. This is because most of these particular alkaloids have mild or little pharmacological action and they occur in low concentration. The most notable instances are poppy seeds, but we eat but small amounts of these, and tobacco and betelnuts, and these are not strictly foods. Solanidine in potato tubers will probably never be harmful because of modern methods of handling, marketing and surveillance.

Credits for figures: Coffee plant, page 12, from Strassle's *Naturgeschichte*, Stuttgart, 1885. Rye, page 13, from Mattioli's *Commentaires*, Lyons, 1579. Tobacco plant, page 13, from l'Ecluse's *Historia Medicinal*, Antwerp, 1579. Potato plant, page 14, from Bauhin's *Prodromos*, Frankfort/M, 1620.

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books

NARCOTIC PLANTS. William Emboden. The Macmillan Co. New York. 1972. 168 pp. $12.95.

In recent years the general public has been made acutely aware of the use of drugs and the role they play in our society. *Narcotic Plants* makes one pause to consider the impact drug use has rendered on civilization throughout the ages. For Dr. Emboden not only traces the origin of the plants but includes their historical significance and psychoactive effects upon cultures which habitually use drugs to alter the state of consciousness.

The use of drugs is as ancient as history and a drug plant can be found to suit every human need—real or imagined. Written for the professional, the book is of interest to the layman as well. The many humorous *and* tragic anecdotes concerning drug use will engage the casual reader. The pharmacology and chemical information of each plant must remain the domain of the professional reader. This reviewer, a non-professional, was inclined to skim over the technical names of active ingredients found in narcotic or poisonous plants. Nevertheless, unfamiliar with the chemical names, I found the subject matter treated in such a way that interest was sustained. And who today is not concerned about the effects of narcotics upon the nervous system?

Of the 168 pages, 72 are devoted to hallucinogens. Categorized as *phantastica* by Lewis Lewin, the famous German physiologist and toxicologist, these plants act upon the central nervous system producing a dreamlike state. For centuries civilizations have relied upon *Cannabis sativa*, the Daturas, opium and peyote, to name a few, to treat disease, invoke the devil, combat evil spirits, and to provide a brief state of euphoria or conversely, somnolency. The origin and use of hallucinogens as medicines, aphrodisiacs, symbolic ornaments, and in ceremonial and religious rites are traced from ancient times. The chemical elements, when known, are included also. The investigation of these hallucinogenic plants is broad in scope, taking the reader from a Bantu tribe of the Belgian Congo, through Asia to the South Pacific where the Kaimbi people in the Western Highlands of New Guinea ingest species of the genus *Boletus* causing a kind of "mushroom madness" or temporary insanity. The investigation continues through North, Central and South America, Europe and the Middle East.

Stimulants, inebriants, tobaccos and snuffs, tranquilizers and sedatives comprise the balance of this well-organized book. Again, the discussion of origin and use traverses all parts of the world, delving into the ancient civilizations and finally arriving at the present.

Camellia thea, Coffea arabica, Theobroma cacao, Cola nitida and *Areca catechu* are the botanical names given to those plants that have been used to relieve exhaustion and temporarily overcome hunger. Millions of people throughout the world would psychologically find it difficult to start the day without a steaming cup of *Coffea arabica*. And anyone who saw "South Pacific" will recall the refrain, "Bloody Mary's chewing betel nuts!" *Areca catechu*, the Betel Palm, is as important to the peoples of southern Asia and the South Pacific Islands as tobacco is to western cultures.

Alkaloids occurring in these plants include the following compounds: caffeine, theophylline, theobromine, and arecoline. These are the substances that account for the variously stimulating character of the drinks brewed from these species.

The chapter on inebriants concludes with a useful chart of alcoholic beverages derived from plants. The beverage, primary area of production, genera of plants and parts used are listed, and divided into wines, beers and distilled spirits.

Frequently misunderstood as a stimulant, alcohol is in fact a depressant on the central nervous system. The author starts with mythological tales of the use of wine and proceeds finally to the highly specialized viticulture of today. Beer and alcoholic beverages are treated in a similar fashion.

A book on narcotic plants cannot overlook the use of tobaccos and snuffs. Originally used as a narcotic by medicine men in South America, tobacco (*Nicotiana tabacum*) quickly spread throughout the world after the Spaniards in Cuba and the British in Virginia discovered the natives smoking, chewing, and snuffing. The interest in and reliance on tobacco continues.

Concluding with tranquilizers and sedatives, a long and interesting account is given of the history and superstitions attached to the mandrake (*Mandragora officinarum*). Ginseng (*Panax quinquefolium: Panax ginseng*) and the tranquilizer *Rauvolfia serpentina* (used by Mahatma Ghandi) are among those discussed —again with the chemical elements, their effects as sedatives, and their historical significance.

The 95 colored plates, divided into two sections, have been carefully chosen as visual aids to the text. Not only are plants illustrated, but there are several colored plates showing pipes used for inhalation and repositories for the storage of drugs. However, the placement of these colorful pictures makes reading awkward as the reader is forced to continually turn from the text in search of the referenced plate. The line cuts, clear in detail, are scattered throughout the book and show in greater depth than do the colored illustrations the methods employed in drug use, but

again the reference makes the reader look for the numbered figure.

Two appendices appear at the back of the book: one on the Chemistry of Hallucinogens; the other, Botanical Descriptions. Both are important for the studious layman and of immense value to the professional. A Selected Bibliography follows, useful for the further study of hallucinogens.

One will find *Narcotic Plants* a valuable source of information. It can serve as a reference book for the botanist, chemist and pharmacologist; as a history book for the scholar interested in early cultures and civilizations. It can also serve as a stimulus to further study and research on the subject of narcotics and the plants that produce them.

Josephine Beck

Josephine Beck, a member of the Arboretum Staff, has done free lance writing for the Evening Bulletin, and made contributions to a feature column.

Many of the people who drank the brew believed, as did their ancestors, that plants and animals were possessed of spirit animation. *Ayahuasca*, like other plants, was believed to have a guardian spirit—a boa constrictor—which appeared to the patient while he was under the effects of the plant. Should that person be brave, the boa, an initially frightening experience, would teach the person his song and function as an omen of future healing. It was hard for me to understand at first why a boa should be so important a creature to tropical forest residents. Then a chance reading of a book on primitive life in the Amazon made it clear that hunters and gatherers of the region admired the boa for its incredible ability to move stealthily through the forest and capture its prey before it became aware of the boa's presence.

The main purpose, then, of the use of *ayahuasca* in Iquitos was revelatory in nature: it permitted a suffering patient to see the cause of his illness. People believed that before healing could actually take place, one must know the source of illness. At that point an *ayahuasquero* would use the spirit forces in nature that he, as a powerful magician, controlled to cause retribution to the evil-doer. In many ways the drug healer operated as a shaman—a traditional medicine man in pre-state societies where, as psychic guardian of his people, his role was to redress any evil or misfortune that befell his charges. *Ayahuasca* healers were admired people. Some had become rich from the fees they collected in healing. Others used their powers without personal gain, performing daily tasks like selling forest produce, fishing and the like, along with the other city peasants.

Unlike some anthropologists who have sought the insider's view, I did not become apprenticed to a healer to learn about the system of knowledge he used. Nonetheless, I tried to learn as much as possible about the types of illness people suffered from and the help they received from the drug healer.

It seems that Western man still has much to learn from the traditional folk healers of the world who are skilled in techniques that aid in the treatment of emotional and psychological illness. When these healers have in their pharmacopeia powerful visionary plants such as *ayahuasca*, Voltaire's adage fits very well: "Nature heals disease while the doctor amuses the patient."

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MORRIS ARBORETUM

JUNE 1974

BULLETIN 25 (2)

THE MORRIS ARBORETUM OF THE UNIVERSITY OF PENNSYLVANIA

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THE MORRIS ARBORETUM BULLETIN

Volume 25 Number 2 June, 1974

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COVER: a not-so-well-known aspect of the otherwise familiar holly. This female flower of the American holly, *Ilex opaca*, unfolds in May, its actual size only about a half centimeter in diameter. The "arrows" are in fact sterile stamens, the male flower parts. Picture credit: David Earnshaw.

EDITOR: Hui-Lin Li ASSISTANT EDITOR: Susan B. Blum

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THE ANDORRA AT THE MORRIS

On a recent walk, this writer and Gary Koller of the Arboretum staff, viewed some of the remains of the once-great Andorra Nursery. Peeping out from years of debilitating undergrowth were pink and white crabapple, Japanese snowbell, American and Japanese holly, yew and magnolia. Red and green Japanese maple abound there in both mature specimens and seedlings. Grand American beeches range in stately avenues, and large chamaecyparis are fighting a losing battle with the grape vines.

The Andorra Nursery was once the largest and most important nursery on the east coast. It reigned not only by virtue of its size, but also for the numerous plants it introduced to American horticulture. Some of these are mentioned in the body of Dr. Swartley's article. It is believed that the Andorra provided most of the now-mature London plane trees in this area. And their distinguished work with rhododendrons produced some of the late-blooming varieties we know today.

John and Lydia Morris were quite friendly with Mr. Harper, manager of the Andorra; their mutual interest in horticulture often brought them together. There seems to have been much back-fence trading of seeds, cuttings and practical experience. As this relationship pre-dated Arboretum record keeping it is impossible to say how many plantings on our grounds are products of the Andorra. However, Mr. John Tonkin, long-time superintendent at the Arboretum, relates that the Atlas cedars at the southwest corner of the Arboretum grounds came from the Andorra. They were imported from England, and planted in the Arboretum circa 1910 when only four to five feet tall. They are now towering specimens, and two of many living monuments to the Andorra's long, great reign.

Susan B. Blum

History of the Andorra Nursery

by John C. Swartley

In the Andorra Nursery catalogue of 1893, which is the earliest one discovered at this writing, the editor, presumably William Warner Harper who signed himself Business Manager, stated that the name came from "the former gentleman's estate". The gentleman was Richard Wistar who, in about the middle of the century, chose a high, wooded hill as the site for a country home. It reminded him of the sunny little country in the Pyrenees called Andorra which has constantly remained independent since 805 A.D.

Although Mr. Wistar never built his house on the hill-top, he did plant many trees, notably magnolia, beech and fir. According to a letter recently received from LeRoy R. Dukenfield, who worked for Andorra Nurseries for many years as sales manager, the land (120 acres) belonged to the Houston Estate. Mr. William Warner Harper, in 1886, leased these 120 acres for the purpose of establishing a nursery. The Wistar Tract consisted of 80 acres.

According to Mr. Dukenfield, the property was bounded on the north by Northwestern Avenue and Barren Hill Road, on the south by Wissahickon Drive and Bells Mill Road, and on the west by an imaginary line one-half way to Ridge Pike.

Mr. Harper was born in 1867 and only nineteen years of age when he founded Andorra Nurseries. Previous to that time, he had been employed by the Yates Nursery, on Germantown Avenue, Chestnut Hill, as a salesman. John Howes Humphries was Bookkeeper for the same nursery. Mr. Humphries apparently followed Mr. Harper to the new venture.

It is not known how Mr. Harper built up such an inventory of nursery stock. It is known that the 'Estate' sent him to England to purchase different varieties of plants. For instance, he purchased a large number of London Plane Trees. At that time, they were known as *"Platanus orientalis"*, now known as *Platanus acerifolia*. The double row of trees bordering the Woodward Property near the McCallum Street Bridge, were planted by Mr. Harper. Most of these trees have succumbed to canker stain disease.

There is also a legend that Henry Dreer, well-known center city florist and seedsman, received a thousand small plants of *Cryptomeria japonica lobbi* from Japan. These had been sent by mistake, in lieu of 1000 foliage plants we presume. We do not know whether Mr. Dreer knew their identity. We do know that Mr. Harper did and acquired them from his good friend, we hope at a most reasonable price.

Mr. Dukenfield writes that these plants were still quite small when he joined the company in 1915. The Cryptomeria Avenue off Hart's Road came from this source.

The 1893 catalogue, entitled "Choice of Hardy Trees, Shrubs, Plants, Roses and Fruits", was quite comprehensive. This catalogue included brief descriptions, prices and cultural directions. Under "Brief Suggestions to Planters", Mr. Harper stated that "the most common error is that of planting too deeply" which still applies today. The listing of ornamentals was imposing, including 48 species and 21 varieties of evergreen trees, 86 species and 48 varieties of deciduous trees and 97 species and 39 varieties of flowering shrubs. As a comparison, the latest available catalogue, 1940, entitled "Andorra Handbook of Trees and Shrubs", has 114 pages, 92 full page illustrations, complete table with mature height, color, texture, useful life, and cultural requirements, but no prices. The list included 47 species and 46 varieties of evergreen trees, 111 species and 40 varieties of decidu-

ous trees, 37 species and 41 varieties of evergreen shrubs, 164 species and 33 varieties of flowering shrubs, 42 species and 20 varieties of vines, besides lilac and clematis varieties. Also included in this catalogue were three additional pages of perennials according to season of bloom with height and color of bloom indicated.

A catalogue of 1895 was similar to that of 1893, but carried a full page advertisement on the back cover, the subject being the "Andorra Brand of Canada Unleached, Hard-wood ashes, Nature's Complete Fertilizer. Barrel of 200 lbs. – $2.50 or $20.00 per ton. Recommended application – 1000-1500 lbs. per acre."

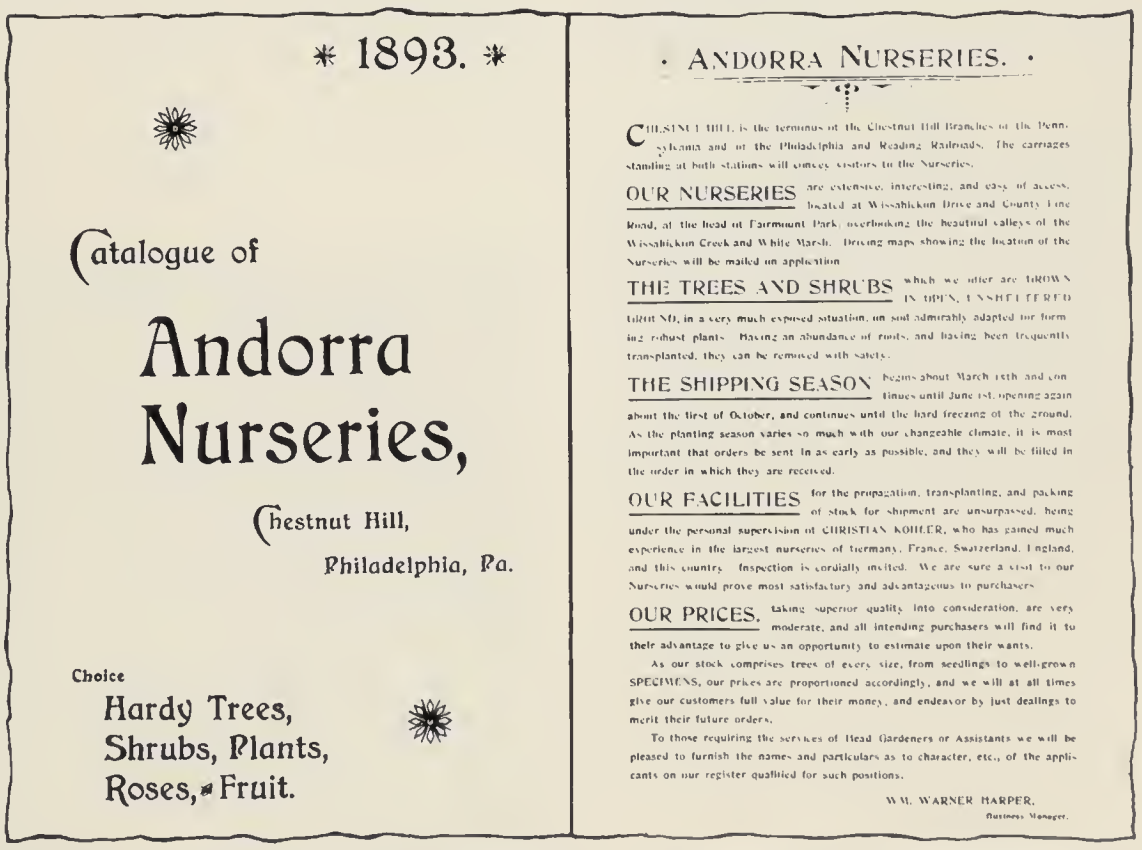
In the 1900 Catalogue and Price List, the acreage was reported to be 500 and William Warner Harper was given the title of "Proprieter". To give an idea of price, Sugar Maple, 1¾ to 2 inch caliber was $1.75, and Japanese Andromeda, 1½ to 2 inch was $1.50.

dodendrons, Ghent azaleas, magnolias and Carles' viburnum in this manner. This was before modern techniques made it possible to grow these plants effectively from cuttings.

In 1926, Andorra was incorporated with Mr. Harper as sole proprietor and President, William Frazier Harrison as Vice President, and Mr. Humphries as Secretary.

Stock was sold to employees, but the lion's share was held by Mr. Harper and Mr. Harrison's father. This was a period of great expansion. Mr. Harrison's father, called the "Sugar King", was the sugar refinery owner, and builder of Grey Towers, now Beaver College.

An additional 400 acres was purchased including land across from the Whitemarsh Country Club and properties along Ridge Pike from Barren Hill to Cherry Lane and west to Spring Mill, then north to Joshua Road.



* 1893. *

Catalogue of

Andorra Nurseries,

Chestnut Hill,

Philadelphia, Pa.

Choice

Hardy Trees,
Shrubs, Plants,
Roses, Fruit.

· ANDORRA NURSERIES. ·

CHESTNUT HILL, is the terminus of the Chestnut Hill Branches of the Pennsylvania and of the Philadelphia and Reading Railroads. The carriages standing at both stations will convey visitors to the Nurseries.

OUR NURSERIES are extensive, interesting, and easy of access, located at Wissahickon Drive and County Line Road, at the head of Fairmount Park, overlooking the beautiful valleys of the Wissahickon Creek and White Marsh. Driving maps showing the location of the Nurseries will be mailed on application.

THE TREES AND SHRUBS which we offer are GROWN IN OPEN, UNSHELTERED GROUND, in a very much exposed situation, and admirably adapted for forming robust plants. Having an abundance of roots, and having been frequently transplanted, they can be removed with safety.

THE SHIPPING SEASON begins about March 15th and continues until June 1st, opening again about the first of October, and continues until the hard freezing of the ground. As the planting season varies so much with our changeable climate, it is most important that orders be sent in as early as possible, and they will be filled in the order in which they are received.

OUR FACILITIES for the propagation, transplanting, and packing of stock for shipment are unsurpassed, being under the personal supervision of CHRISTIAN KOHLER, who has gained much experience in the largest nurseries of Germany, France, Switzerland, England, and this country. Inspection is cordially invited. We are sure a visit to our Nurseries would prove most satisfactory and advantageous to purchasers.

OUR PRICES, taking superior quality into consideration, are very moderate, and all intending purchasers will find it to their advantage to give us an opportunity to estimate upon their wants.

As our stock comprises trees of every size, from seedlings to well-grown SPECIMENS, our prices are proportioned accordingly, and we will at all times give our customers full value for their money, and endeavor by just dealings to merit their future orders.

To those requiring the services of Head Gardeners or Assistants we will be pleased to furnish the names and particulars as to character, etc., of the applicants on our register qualified for such positions.

WM. WARNER HARPER,
Business Manager.

Facsimile of the cover and frontispiece of the Andorra Nursery Catalogue, 1893.

Beginning with 1903, the Company issued smaller catalogues of trees and shrubs, roses and fruits for the trade. In 1917, a large catalogue entitled "Suggestions for Effective Planting", appeared and the nursery area was reported to be over 1000 acres. Prices had not increased greatly; Sugar Maple, 1½ to 1¾ inch caliber was $2.50 and Japanese Andromeda, 1½ to 2 inch was also $2.50. Through the years Andorra Nurseries has been noted for growing a wide variety of quality material.

For many years, Andorra maintained one of the largest layering beds in the country, propagating rho-

When Mr. Harper died in 1934, Mr. Harrison became President and Mr. Humphries, Vice-President. These were depression years. For instance, in the early 1930's, Joseph Schwab had been employed as a plant protection expert. The next year he was offered a job as salesman. If he refused this they would accept his resignation. They felt it was more important to sell plants than to protect them unsold in the nursery. Mr. Schwab was given the Wilmington territory where some DuPont executives still had good incomes. It was hard going at first, but he made a success of the job and later became nursery superintendent. In this

position, and in selling, he remained with Andorra until it was sold.

In the 1920's, Towson Nurseries near Towson, Maryland, was started as an off-shoot of Andorra. Apparently Mrs. Harper was a Garrett of Baltimore, a well-established and well-to-do family. She had a nephew, William Garrett, who was interested in the nursery business. Mr. Harper eooperated by helping him to set up Towson Nurseries. In the beginning they eolleeted boxwood for resale, but a severe winter killed three-quarters of their stock. Then earload after carload of nursery stoek was shipped to Towson to give the business a fast start. Meanwhile a eapable propagator, Edward Saurbrey, was hired and another sueeessful nursery was on its way.

Mr. Dukenfield has kindly supplied me with the list of staff of Andorra Nurseries in 1942.

Officers
W. Frazier Harrison, Pres.
J. Howes Humphries, V.P.
F.E.L. Killen, See.
L.B. Prinee, Treas.

Landscape Dept.
Arthur M. Paul, L.A.

Production Dept.
Joseph Schwab, Nur. Sup.
Archie Lightkep, Propagator

Directors
W. Frazier Harrison
George D. Widener
W.B. Read
B.F. Meehling, Jr.
Frederiek L. Ballard
Gerald Ronon

Sales Dept.
LeRoy R. Dukenfield,
Sales Mgr.
Jean H. Cojan
Donald Maekubbin
Walter L. Skoglund

. . . . crabapples in bloom
on the old Andorra Nursery site.

Later in 1942, Mr. Harrison died and was followed by Mr. Paul ás President. Mr. Paul's widow is still living, though in very poor health. Aeeording to a recent indirect statement from her, Arthur M. Paul was a mainstay of Andorra Nurseries for over 40 years. Beforc he became presidcnt hc was in eharge of sales as thc company's landscapc arehitect.

Sometime during World War II the officc was moved from the original site to thc old Andorra Inn, Ridge and Butler Pikes. Thc reason given was to avoid the Philadelphia wage tax.

After Mr. Paul died in 1953, the business was taken over by the Liberty Real Estate Bank with policy deeisions being made by Thomas Braekin as President, from his offiee in the bank, with day-to-day affairs implemented by Clinton H. Brown as Viee President. Donald Miller was Seeretary-Treasurer from 1956-1961. The last few years, Andorra Nurseries operated a garden eenter at two sueeessive loeations east of Dale's Food Market. A changing world eaught up with this far-flung nursery operation; expensive sewage operations were required on the property. So, finally, on June 2, 1961, Andorra Nurseries was sold to Harry Kravitz, a developer, bringing to an end a great nursery.

It is interesting to note that trees, planted by Andorra in nursery rows many years ago, may be observed in Lafayette Hill and other developed areas.

Koller

shrub profiles

CLETHRA BARBINERVIS

by Gary Koller

Spring arrives with a rapidly changing profusion of flowering ornamentals. However, by late June the major blooming period has passed and, except for annuals and selected perennials, landscape color returns to green.

Careful selection of shrubs allows mid-summer green to be interrupted by spots of color. One late flowering, free blooming shrub is *Clethra barbinervis.* Commonly known as Asiatic Sweet Pepperbush this plant was introduced from its native home of Japan into European gardens during 1870.

Naturally growing to a height of 30 feet, it is usually less tall under garden culture. Best growth occurs in full sun with moist, well drained acid soil. With adequate soil moisture this plant will remain pest free.

The oval leaves are alternate, two to four inches long and about half as wide. Summer foliage color is dark green and there is little autumn coloration prior to leaf fall.

Clusters of fragrant, creamy white flowers appear in mid-July making this the first Clethra to bloom. Terminal panicles, four to six inches long, are borne horizontally and give the appearance of being semi-pendulous. Individual blossoms are about 1/3 inch across.

Exfoliating bark patterns provide a second season of landscape interest. During winter patches of young cinnamon-brown bark contrast against the older greenish-brown bark creating an interesting pattern which changes with time.

While this plant is completely hardy in the Philadelphia area, it is more tender than *Clethra alnifolia*, our native Summersweet. *Clethra barbinervis* is said to be less fragrant, suckers less and is more resistant to red spiders than *C. alnifolia.*

Plants can be propagated by means of seeds, layers or cuttings. During mid-summer cuttings containing a heel of old wood root readily. Greater success and speed result from the application of rooting hormones, high humidity and bottom heat.

Koller

Landscape uses include specimen and accent plantings. Because the sweetly fragrant flowers attract honey bees plants should be located away from walkways and sitting areas. However, from a terrace a distant planting provides a most attractive view. Companion plants might include *Rhododendron prunifolium* (crimson flowers), *Oxydendron arboreum* (cream colored flowers), or *Coreopsis lanceolata* (golden flowers).

This plant may be difficult to locate in nurseries but years of summer floral beauty will reward those who succeed.

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FOLK-REMEDY PLANTS *IN CORO,*

by Julia F. Morton, Director
Morton Collectanea, University of Miami

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In previous papers (8, 9, 10, 11, 12, 13), I have reported on the active use of local plants for beverage and medicinal purposes on the island of Curacao and in the Low Country of South Carolina. In both regions a high incidence of esophageal cancer prevails. Biological screening of Curacao plants most commonly ingested by victims of esophageal cancer has directed attention to two species, *Krameria ixina* L. (14, 15) and *Melochia tomentosa* L., which produced fibrosarcomas at the injection site in 100% of the laboratory animals receiving the extract; a third species, *Acacia villosa* Willd., which proved highly toxic but resulted in early fibrosarcomas in 100% of the animals surviving the injection of a dilute extract; and a fourth species, *Heliotropium angiospermum* Murr., which gave rise to sarcomas in 75% of the subjects (15). The first three species belong to three different families and are similar only in their high level of condensed tannin and related anthocyanadins. All three yield an astringent, purple-red or red-brown decoction. The tannin content of the fourth plant, belonging to a fourth family, is unknown but it quickly turns black on drying and Standley states that in Yucatan it "is given as a remedy for dysentery, nosebleed and diseased gums and is applied to sores and swellings" (21). Such uses are typical of plants which owe their astringency to their tannin/anthocyanin content. The absence of significant tumors in animals receiving a tannin-free extract of *Krameria ixina* (15), together with the habitual consumption of tannin-rich plant potions in the high-risk region of South Carolina (13), suggest a possible correlation between condensed tannin intake and esophageal cancer.

Throughout my eight-year search for causes of the disease I have sought to narrow down the investigation by comparative field studies. During the course of work in Curacao, I had been told that *Krameria ixina* (called "*cadia del perro*" in Papiamento) was formerly brought over from Coro, on the northwest

1. *Krameria ixina* L. (Fam.: Krameriaceae) is "*cadia del perro*" in Curacao, "*cadillo del perro*" in Coro. The fresh or dried plant is commonly sold on the native markets and the red-purple decoction is a popular tonic, believed to be good for the liver and kidneys. In bio-assay at the National Cancer Institute, the plant extract produced sarcomas at the injection site in 100% of the test animals. A tannin-free extract of the plant caused no tumors (15).

Insert: The "*cadillo del perro*" of Maracaibo is *Urena sinuata* L. (Fam.: Malvaceae), which has deeply lobed leaves and bur-like fruits which cling to dogs and to human clothing. Bundles of the dried plant are abundant on the native market in Maracaibo and the plant decoction is widely regarded as beneficial to the liver and kidneys. This plant is unknown in Curacao and Coro. Its reputation apparently has been erroneously transferred to the "*cadillo del perro*" (*Krameria ixina* L.) of Coro (background) and thence to Curacao.

3. (*Right.*) *Heliotropium angiospermum* Murr. (Fam.: Boraginaceae), "*cocolode*". Bundles of the dried plant are sold in the native market of Curacao. It is a standard practice to give a combined decoction of this plant and "*tanchi*" (*Capraria biflora* L.) to infants 1-3 weeks old (8). Extract of the freeze-dried plant, in bio-assay, caused sarcomas in 75% of the animals injected (15).

and ESOPHAGEAL CANCER *VENEZUELA*

2. *Melochia tomentosa* L. (Fam.: Sterculiaceae) – "*basora corra*" or "*betonica*" in Curacao; "*cariaquito morado*" or "*bretonica*" in Coro – has downy, gray leaves and lavender pink flowers. The leaves but not the red-purple stems are sometimes eaten by goats and wild donkeys. In Curacao, the root decoction is gargled to relieve throat inflammation. The shrub is abundant close to the coasts in Curacao; common at sea level in Coro and on the nearby mountains.

All photos in this article are by the author.

coast of Venezuela, before people knew that it could be found in Curacao on heights near the sea; and one habitual user had started taking the decoction after hearing of its being acclaimed in Maracaibo as beneficial to the liver and kidneys. It therefore seemed desirable to ascertain: 1) if the same plant is native to northwestern Venezuela; 2) if the decoction is commonly ingested as it is in Curacao; 3) if there is a notable frequency of esophageal cancer in the area where it is so employed.

At the end of August, 1972, I went to Maracaibo, won the interest and collaboration of Dr. Alfredo Belloso, president of the Liga Anticancerosa, and, at my request, was escorted by him to the native market at Quinta Crespo, Baralt Avenue, which he had never before visited and which he found exciting. There were two stalls with elaborate displays of locally-used medicinal plants and other curiosities such as a jar of rum containing a coiled snake. Taken internally, the rum is considered a remedy for fractures. Dr. Belloso recalled that, when he had broken his arm in a fall from a horse, various people urged him to take this "cure".

The amiable herb vendors agreed that the herb in greatest demand is "*llanten*" – the Spanish name for plantain (*Plantago major* L.) – and second in popularity is "*romero*" – rosemary (*Rosmarinus officinalis* L.). When I inquired for "*cadia del perro*," they enthusiastically produced dried bundles of a plant quite different from the *Krameria ixina* of Curacao. Known as "*cadillo del perro*" (the Spanish original of the Papiamento corruption), it is *Urena sinuata* L. (syn. *U. lobata* var. *sinuata* Miq.). When I explained that this was not the plant I was seeking, one vendor said that there were two kinds of "*cadillo del perro*" – "*blanco*" (white) sold in this market and another, "*morado*" (purple), which is not found around Maracaibo. The closest place where it grows is Barquisimeto nearer the coast. The "*blanco*" is renowned in Maracaibo and Dr. Edgar Viso, a physician of long experience, told me that he has for years recommended the decoction as beneficial to the liver of men who drink too much, and also as a diuretic. *Urena sinuata* is a pantropic member of the Malvaceae and, like *U. lobata*, is mucilaginous and emollient in effect (17).

4. *Acacia villosa* Willd. (Fam.: Leguminosae), called "*wata-pana shimaron*" or "*mata galinja*" in Curacao, is a non-spiny shrub, common over most of the island. Goats do not eat the lush foliage, though they graze constantly on the leaves of the viciously spiny "*wabi*" (*Acacia tortuosa* Willd.). A decoction of the bark, root, leaves or peeled branch is gargled to relieve sorethroat. During the diphtheria epidemic of 1875, Curacao's leading physician urged that mothers have their children gargle and swallow a combined decoction of the roots of *Acacia villosa* and *Melochia tomentosa* several times a day as a preventive measure (12).

It is apparently neither tanniferous nor astringent. It occurred to me that the reputation of the "white", innocuous "*cadillo del perro*" of Maracaibo may havc been mistakenly transferred to the "purple" and probably harmful *Krameria ixina* of Curacao.

Dr. Belloso magnanimously arranged meetings with cancer specialists and access to hospital archives. We found no great professional intercst in esophageal cancer. Statistics for Venezuela as a whole for the pcriod 1961-69 show stomach cancer as the leading malignancy – 9,926 cases; 22.7% of all; with the esophagus tenth among the 14 primary sitcs specified: 1,175 cases; 2.7% of all (4). However, examination of patients' records at our request proved intriguing and stimulating to the cooperating physicians and surgeons. Dr. Gustavo Trocornis, who operates on treatablc cancer cases at the Hospital General del Sur, on investigation, found that, of 50 csophageal cancer cases sent to him as operable during the past eight years, 25% came from Coro. Dr. Enrique Molina, of the Clinica Falcon, Hospital Central, at first believed my field of inquiry irrelevant to Venezuela. Nevertheless, he took pains to explore the matter, prepared a tabulation of 68 cases and discovered that, of these, 26 were patients from the coastal State of Falcon, of which Coro is the capital. He and Dr. Trocornis, Dr. Vinicio Casas Rincon, Director of the Centro de Pesquisas del Zulia, Dr. Hcctor Nava Acevedo and their colleagues joincd with Dr. Bclloso and Dr. Viso in avid interest in my theory of a possible correlation bctween plant usage and esophageal cancer and eagerness to lcarn of further findings.

Dr. Belloso arranged a mecting with Ingenicro Efren Mendoza Ravelo, Agronomist, Facultad Agronomia, Univcrsidad de Zulia (whom I had mct at a horticultural congress in Cagua, Venezuela, in 1964). Ing. Mendoza insisted on driving me to Coro to introduce me to his friend, Dr. Roberto Grand, Surgeon at the Clinica San Juan Bosco, and solicit his aid in my investigation. It was a four-hour drive across Lake Maracaibo and northeastward. Two hours out from Maracaibo, the terrain and vcgetation began to display the arid and xerophytic aspects of Curacao. The poverty-ridden State of Falcon is a narrow strip along the coast, with the island of Curacao only 35 miles offshore. Falcon embraces an area of 24,800 km. and has a population of 340,450 – a density of 14 people per sq. km. (7). Coro (the Indian word for "wind") was the original capital of Venezuela. It is revered as the site of the first celebration of Mass on the mainland of South America, which took place in 1527 under the spreading branches of the "*cuji*", or mesquite (*Prosopis juliflora* DC.), the state tree of Falcon (1). A rough-hewn cross of "*cuji*" wood is prescrved as a momento in the *Ermita de San Clemente* in a little park near the center of the city.

Coro dcserves to be an interfaith mccca, for it served as a refuge for the Jewish people who were banished from Brazil in 1797 and were allowed to settle there as farmers. Failing in this rolc, most migratcd to Curacao. A number returned to Coro in 1825 bccause of thc cxtreme drought which had prevailcd in Curacao for six years. They fled back to Curacao during the Venezuclan Civil War of 1847-48, returncd and were expelled in 1855; went back in 1858 (5).

Because of the arm of the Andcs extcnding nearly to the coast, Coro was virtually cut off from the rest of Venezuela until after the exploitation of the oil rcsources of Lakc Maracaibo was well under way.

The narrow asphalt road to Coro was built about thirty years ago and later extended to the Creole and Shell refineries on the peninsula of Paraguana. In the past, Coro's only contact with the outside world was by sailing vessel to Curacao and, at times, even this communication was cut off by embargoes, closing of ports and suspension of trade between Venezuela and Curacao because of political conflicts, smuggling or quarantines during epidemics. At such times, there were undoubtedly shortages of drugs and other supplies; in one instance, a cargo of medicine was confiscated. As in South Carolina during the Civil War blockade, the people would have been forced to turn to local plants in substitution for imported drugs (5). In view of the movement of Jewish physicians and pharmacists back and forth between Coro and Curacao, it is reasonable to expect similarities in medicinal plant usage.

On arrival in Coro, Ing. Mendoza and I drove to the seashore looking for *Krameria ixina*. Between Coro and the peninsula are immense, shifting sand dunes and lesser dunes extend a few miles along the coast toward the east. Here, intermingled with other species not found in the Netherlands Antilles, several plants typical of Curacao flourish, especially *Croton flavens* L., *Jatropha gossypifolia* L., in abundance, and, further along, *Cereus repandus* Mill., *Guaiacum officinale* L., *Caesalpinia coriaria* Willd., and *Prosopis juliflora* DC. The thorny *Acacia tortuosa* Willd. is one of the commonest plants, as in Curacao.

We stopped frequently to scan the steep drop down to the sea, but saw no *Krameria*. Finally, we inquired at a roadside cafe and were told that the plant was well known in LaVela, the port of Coro. At this village, people hearing of our quest pointed to the foothills of the mountains paralleling the road, about two miles back from the coast, and they declared that the plant could be purchased on the market in Coro. Returning to the small city, we made our way through the Saturday night bustle in the covered market and came upon three stalls with numerous bundles and heaps of fresh or partly dried weeds, leaves, bark and roots – not neatly arranged as in Maracaibo, but piled in disarray as in Curacao. Ing. Mendoza marvelled at the assortment. As soon as we mentioned "*cadillo del perro*" at the first stall, the pleasant, part-Indian vendor offered us two dry bundles of *Krameria ixina* and told us that she gathers it around Carrizalito on the mountains – La Sierra de San Luis. The plant was plentiful in the other stalls but the "*cadillo del perro*" of Maracaibo (*Urena sinuata*) was not in evidence and seemingly unknown. A few days later, I hired a driver to go up the mountains toward San Luis. Along the extremely dangerous, winding road, *Cro-*

5. The *cuji* (mesquite), *Prosopis juliflora* DC., is the state tree of the arid, coastal state of Falcon, of which Coro is the capital. Grand old specimens such as this provide welcome shade in Coro as in Curacao where the tree is known as "*indju*" or "*kwihi*".

ton flavens is common, as well as *Melochia tomentosa*. The mountain slopes are, in some areas, dry and partly barren or clothed mainly with thorny scrub and cacti. We asked for "*cadillo del perro*" along the way and were directed to Cucaire where we stopped at a small farm. Borrowing two little boys as guides, I climbed a steep, faint trail to the mountaintop and there found *Krameria ixina* growing plentifully.

Subsequently, through the courtesy of Dr. Grand and Dr. Celso Gonzalez Medina, Gastroenterologist, Centro Medico, I was able to interview two elderly victims of esophageal cancer, one a lady of culture in an attractive home, the other in limited economic circumstances. Both admitted the use of several plant decoctions as "teas" or remedies, including that of *Krameria ixina*. The daughter of the second lady declared her mother drank "*cadillo del perro*" whenever she wasn't feeling well and added, defensively, "Everybody does!"

In repeat visits to the market, I purchased fresh or dried material of 47 different species valued in folk medicine. Trade was so brisk that my favorite vendor could give little attention to my need for information on the uses of each. Sometimes she was asked to recommend a plant for a particular ailment. Usually, the customers knew what they wanted. When she was hard-pressed, I helped her to wait on the people by delving into sacks and heaps to find the needed bundle, much to her surprise and quiet amusement.

Most of the medicinal plants of Coro are indigenous species; a few are European plants which have become naturalized or are cultivated in gardens. Of the 47 species I acquired, 12 are commonly employed for "bush tea" in Curacao. These include, beside *Krameria ixina*, *Melochia tomentosa* – "*cariaquito morado*" in Coro, "*basora corra*" or "*betonica*" in Curacao; *Croton flavens* – "*salvia*" in Coro, "*welensali*" (wild salvia) in Curacao; and *Croton ovalifolius*, "*matejea*" in Coro, "*chubatu*" in Curacao.

Of 13 other plants which I learned were used medicinally in Coro, nine are familiar folk remedies of Curacao. One practice in common is the imbibing of a decoction of the highly astringent unripe guava (*Psidium guajava* L.) to halt diarrhea. A popular verse in Coro is: "*Cuando la diarrea es grave, no bastan guayabas verdes.*" (When diarrhea is serious, there aren't enough green guavas!) (18). Adult diarrhea is a greater problem in Coro than in Curacao. For severe cases, they sell a portion of woody stem called "*contrematо,*" identified by Dr. Tobias Lasser, Instituto Botanico, Caracas, as a species of *Aristolochia.* My helpful driver, Esteban Ruiz, told me that one time in his youth he, his mother and grandmother were suffering bloody diarrhea with terrible cramps and nothing gave them relief. It was in the days when the mountain people had no transportation and walked down the unpaved road with their bundles of herbs. An Indian woman came to their door with a supply of "*contrematо*", told them to grate the stems, boil, and drink the liquid, three cups a day for three days. They did, and were suddenly and perfectly well, "like a miracle". The decoction was very bitter. *Aristolochia* species are widely employed as snakebite remedies in Latin America (6, 16). None occur wild in Curacao where only *A. grandiflora* Sw. is occasionally grown as an ornamental (2).

My driver demonstrated the use of one Coro folk-medicine plant of particular interest to botanists. This

6. Forty-seven species are represented by these bundles and pieces of roots and bark from the native market of Coro. Material from each specimen has been restored, pressed and mounted with identification on an herbarium sheet filed in the Buswell Herbarium of the University of Miami. The local uses of these and thirteen other folk-remedy plants of Coro are shown in the accompanying table, with notes on Curacao uses of those which occur also on that island.

7. The *supi (Pereskia guamacho* Weber) abounds with other cacti along the entire, dry Caribbean coast of Venezuela and Colombia. It bears showy yellow flowers in the spring, followed by sweet, edible fruits.

is the "*supi*" (*Pereskia guamacho* Weber), a tree-like eactus eommon on the dry, hot eoast of northern Venezuela. It has thiek, flaky bark and elusters of blaek needles on the trunk. He started to eut the trunk to make the sap exude, but I asked him to move to the other side where the light was better. There we found a gash where other people had obtained the sap, or gum. He eut the spot to make more flow. The gum is boiled and the liquid given to children who have persistent eough – aetually whooping eough, "*tos ferina.*"

Some plants sueh as *Jatropha gossypifolia* whieh are eommon to Coro and Curaeao, with similar uses, have totally different names in the two areas. This speeies is known as "*flaira*" in Curaeao and "*sividigua*" in Coro. Other vernaeular plant names, like that of *Croton flavens*, already eited, show eultural links to Curaeao and indieate that the folk use originated in Coro and was eonveyed to Curaeao, as I assume happened in regard to the misguided ingestion of *Krameria ixina.* In Coro, "*mapurite*" (meaning "skunk") is the vernaeular name for *Roupala mollis* Pittier, and a leaf deeoetion is given as a remedy for grippe. Trees of the genus *Roupala* are noted for the skunklike odor of the wood and foliage (19, 20). No *Roupala* speeies oeeurs in Curaeao but the Papiamento eorruption, "*mampuritu*", is there applied to *Porophyllum macrocephalum* DC. whieh has a peeuliar musky seent yet the deeoetion is mueh eonsumed as a "tea" and to relieve stomaeh eomplaints, flatulenee and nausea (9).

I did not find *Acacia villosa* nor *Heliotropium angiospermum* in or around Coro, but, beeause of the presenee and use of *Krameria* and *Melochia* and other astringent plant materials, I was eager to obtain more data on the loeal ineidenee of esophageal eaneer. Dr. Celso Gonzalez took the trouble to examine the reeords of the Centro Medieo and gave me this

summary: In 28 months, there were seen 2,284 cases of cancer: 1,000 "Clinica Privada"; 1,284 "Seguro Social"; four cases of esophageal cancer among thc former and 11 among the latter. If one were to add to these 15 cases an estimated five Coro cases treated in Maracaibo during the same period, and weigh the total roughly against Coro's population of only 45,000, the result would indicate a frequency somewhat higher than Curacao's average of 20 cases per year in a population of 140,000.

Lest I leave the impression that the local hazard is limited to the use of medicinal plants, I must add that a red-seeded sorghum (which should be high in phenols) is grown and consumed by some residents of Coro (18). I have previously called attention to pigmented sorghums as staple foods or the basis of beer in other high-risk areas of the world (10, 12).

Also, I was told of a Maracaibo gentleman, aged 38, who recently succumbed to esophageal cancer. He was not given to folk remedies but he drank vermouth after lunch every day for years. Vermouth (according to J. Merory, *Food Flavorings*, 2nd ed., AVI Publishing Co., 1968) has a number of botanical ingredients including Calamus root (*Acorus calamus* L.) which was banned as a food additive in the United States in 1968 after a rat-feeding study showed oil of calamus to be carcinogenic (Federal Register, May 9, 1968). Another ingredient is wormwood (*Artemisia absinthium* L.) containing toxic thujone which is also banned by our F&DA, and to some vermouths there may be added blessed thistle (*Cnicus benedictus* L.) and/or European centaury (*Centaurea calcitrapa* L.), known gastric irritants (22).

The statistics and the folkways of Coro assuredly deserve more prolonged and intimate study and may strengthen the seeming correlation between tannin ingestion and cancer of thc esophagus.

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PRELIMINARY LIST OF FOLK-MEDICINE PLANTS OF CORO WITH NOTES ON THOSE USED ALSO IN CURACAO

Plant Family	Coro Name	Coro Uses	Curacao Name	Curacao Uses
Achyrocline satureoides DC COMPOSITAE	MIRABIRA	Plant decoction; external* and internal for diabetes.	Not in Curacao.	——
Aloe barbadensis Mill. LILIACEAE	ZÁBILA	Bitter latex taken as laxative.	SENTEBIBU	Latex taken as laxative. Clear pulp eaten or boiled and decoction taken as a laxative and for colds. Pulp applied to sores and shingles. Pulp juice taken for gall bladder trouble.
Alpinia speciosa Schum. ZINGIBERACEAE	PARAISO	Flower spikes; decoction taken internally for grippe.	Not in Curacao.	——
Ambrosia cumanensis HBK. COMPOSITAE	ATEMISIA	Plant decoction taken internally by infants and adults.	Not in Curacao.	*Ambrosia artemisiifolia* L. is a cold remedy.
Amyris simplicifolia Karst. RUTACEAE	CANDIL	Leaf decoction internally during menstrual periods.	Rare in Curacao. No vernacular name (3).	——
Aristolochia sp. ARISTOLOCHIACEAE	CONTREMATO	Stem decoction taken internally for severe diarrhea.	Not in Curacao.	——
Borreria laevis Gris. RUBIACEAE	SANTA MARIITA	Plant decoction used externally.	Indigenous but no vernacular name (3).	——
Bouchea prismatica Kuntze VERBENACEAE	VERBENA DE OLOR	Plant decoction taken internally as emmenagogue.	YERBA DI STATIA; SHON LENA (3).	——
Calotropis procera R. Br. ASCLEPIADACEAE	ALGODON DE SIERRA	Latex used on skin complaints.	KATUNA DI SEDA	Leaves bound on aching head or painful feet; crushed leaves on rheumatic joints or other painful places.
Capparis linearis Jacq. CAPPARIDACEAE	OLIBA MACHU	Decoction of leafy twigs used externally.	KEDEBESHI (3).	——
Cassia obovata Collad. LEGUMINOSAE	SEN; BRUSCA HEDIONDA	Decoction of leafy tips taken internally as laxative.	SÉNEBLA	Leaf decoction given as vermifuge or laxative.
Chenopodium ambrosioides L. CHENOPODIACEAE	SAGRADO	Leaves boiled in sugar sirup given as a vermifuge.	SAGRADO	Leaf decoction given as a vermifuge; also as remedy for stomachache and measles.
Citharexylum caudatum L. VERBENACEAE	HIGUERILLA	Leaf decoction taken internally for colds.	Not in Curacao.	——
Coleus amboinicus Lour. LABIATAE	OREJON	Leaves used for flavoring; leaf decoction internally for good digestion.	OREGANO POLEO; COWSLIP	Decoction considered good for stomach.
Commelina diffusa Burm. f. (*C. cayennensis* Rich.) COMMELINACEAE	SUELDA CONSUELDA	Plant decoction internally for kidney complaints and for refreshment.	Not in Curacao.	*Commelina virginica* L. decoction taken by men for venereal disease. Flower decoction used on leg sores.
Cosmos sulphureus Cav. COMPOSITAE	DICTAMO REAL	Plant decoction applied externally.	COSMOS	Grown as a garden flower. (2)
Croton flavens L. EUPHORBIACEAE	SALVIA	Leafy tips boiled and decoction taken as "tea"; a general remedy.	WELENSALI	Leaf decoction a popular "tea", taken every morning or occasionally as a remedy for rheumatism, menstrual cramps, etc. (11).
Croton ovalifolius Vahl EUPHORBIACEAE	MATEJEA	Leafy tips boiled and decoction taken for stomach trouble and grippe.	CHUBÁTU	Decoction of leafy tips taken for stomachache, mainly by men.

* In the book, *La Región de Perijá y sus Habitantes* (Sociedad de Ciencias Naturales la Salle, Universidad del Zulia, 1953), it is stated that the folk medicine of the Chaké Indians is based mainly on the use of a great diversity of plants, rubbed on the body or applied as poultices, as well as made into decoctions to be taken internally or used to bathe the body as a panacea. The part-Indian people of Coro retain the practice of bathing with plant decoctions for therapeutic purposes.

PRELIMINARY LIST OF FOLK-MEDICINE PLANTS OF CORO WITH NOTES ON THOSE USED ALSO IN CURACAO (Continued)

Plant Family	Coro Name	Coro Uses	Curacao Name	Curacao Uses
Desmodium canum Schinz & Thell. (*D. supinum* DC.) LEGUMINOSAE	PEGA PEGA	Plant decoction applied externally.	Indigenous but no vernacular name (3).	——
Eucalyptus globulus Labill. MYRTACEAE	EUCALIPTO	Leaf decoction taken internally for colds.	Not in Curacao.	——
Geranium mexicanum Hook. GERANIACEAE	DULZIA	Decoction of leafy stems taken internally for grippe.	Not in Curacao.	——
Helianthus annuus L. COMPOSITAE	GIRASOL	Leaf decoction used externally for rheumatism.	GIRASOL; ZONNEBLOEM	Occasionally planted (2).
Hymenaea courbaril L. LEGUMINOSAE	ALGARROBA	Bark decoction internally for grippe and chest ailments.	Not in Curacao.	——
Hyptis suaveolens Poit. LABIATAE	MASTRAN MORADO	Plant decoction taken internally and used externally.	SANGURA	Weak plant decoction a popular "tea" for good appetite; also a remedy for indigestion and nausea.
Jatropha curcas L. EUPHORBIACEAE	PIÑON	Twigs with leaves and flowers boiled and decoction used externally.	PURGEERNOOT Rare in Curacao.	——
Jatropha gossypifolia L. EUPHORBIACEAE	SIVIDIGUA	Sap applied to wounds, stops bleeding. Decoction of stems and leaves used to bathe babies' rash.	FLAIRA	Sap applied to cuts and scratches. Leaf "tea" for teething babies to control infant diarrhea; also taken by adults for stomachache and throat irritation, and used for bathing wounds. Root decoction taken for diabetes and sorethroat, also with oil for stomachache and bloody stool.
Krameria ixina L. KRAMERIACEAE	CADILLO DEL PERRO	Plant decoction commonly taken internally as tonic for the liver, or whenever not feeling well.	CADIA DEL PERRO	Plant decoction popular, believed good for kidneys and may be taken every morning, especially after overindulgence in alcohol; may be taken several times a day for "liver trouble". Also a remedy for kidney stones and an emmenagogue. Very strong decoction is abortifacient.
Leonotis nepetifolia R. Br. LABIATAE	MASTRÁN	Decoction of plant or of flowerheads taken internally as a general remedy.	PONPON; YERBA DI KERKHOF. Indigenous.	No known use.
Lepidium virginicum L. CRUCIFERAE	MASTUERZO	Plant decoction taken for fever, by children and adults.	Not in Curacao.	——
Lippia alba N. E. Br. VERBENACEAE	TORONJIL	Plant decoction taken internally for colds and grippe. Boiled with *Plantago major* (q.v.) and lettuce and the liquid taken to induce good sleep.	OREGANO	Leaves used for flavoring. Plant decoction considered good for stomach. A cold remedy and popular "tea"; may be taken every morning or every night.
Lippia origanoides HBK. VERBENACEAE	OREGANO	Plant used for flavoring. Plant decoction taken as "tea" to stimulate appetite; soothe stomach.	Not in Curacao.	——
Mangifera indica L. ANACARDIACEAE	MANGO	Leaf "tea" popular as a beverage.	MANGO	Leaf "tea" taken as a remedy for high blood pressure; some drinking it daily.
Majorana hortensis Moench. LABIATAE	MEJORANA	Plant decoction taken internally.	Not in Curacao.	——
Melochia tomentosa L. STERCULIACEAE	CARIAQUITO MORADO*; BRETONICA	Plant decoction taken internally and used externally.	BASORA CORRÁ; BETONICA	Decoction of leaves or root gargled to relieve sorethroat.

PRELIMINARY LIST OF FOLK-MEDICINE PLANTS OF CORO WITH NOTES ON THOSE USED ALSO IN CURACAO (Continued)

Plant Family	Coro Name	Coro Uses	Curacao Name	Curacao Uses
Mentha nemorosa Willd. LABIATAE	JERBA BUENA	Decoction taken internally for nausea and as a beverage; some add milk and sugar.	YERBA BUENA	Plant decoction taken to dispel gas.
Momordica charantia var. *abbreviata* Ser. CUCURBITACEAE	CUNDEAMOR	Vine decoction taken internally for kidney stones.	MOMÓTICA	Vine decoction with sugar drunk for high blood pressure.
Moringa oleifera Lam. MORINGACEAE	MACASAL	Seed decoction and leaf decoction taken internally as purgative and vermifuge.	BENBOM; BENOLI; MORINGUM	Flower decoction for coughs and colds. Crushed root soaked in rum and rubbed on rheumatic joints. Seed oil formerly used for cooking.
Nectandra pichurim Mez. LAURACEAE	LAUREL	Leaf decoction used externally.	Not in Curacao.	——
Ocimum basilicum L. LABIATAE	ALBAHACA	Plant decoction taken internally for grippe and stomach complaints.	Rare in Curacao. (2) *O. sanctum* L. called YERBA HOLÉ, HOLÉ BLANCU, is popular.	*O. sanctum* used for flavoring. "Tea" a common remedy for infants and adults.
Pectis linifolia L. COMPOSITAE	MANZANILLA	Plant decoction taken for stomach discomfort and nausea.	TEBINK MACHU ("male" tebink)	Considered undesirable in Curacao. *P. febrifuga* van Hall formerly much used as "tea". Now scarce in dry periods but common remedy for fevers.
Pelargonium peltatum Ait. GERANIACEAE	GERANIO	Leafy stems and flowers boiled; decoction applied externally.	Not in Curacao.	——
Pereskia guamacho Weber CACTACEAE	SUPÍ	Gum from trunk decocted and given internally to children with whooping cough.	GUAMACHO	Introduced into Curacao in 1850 at Kanga Plantation. A sirup made from the leaves relieves asthma (2).
Petiveria alliacea L. PHYTOLACCACEAE	ANAMÚ	Leaf decoction taken for bladder inflammation; used for bathing infants, and as a foot bath.	Not in Curacao.	——
Plantago major L. PLANTAGINACEAE	LLANTEN	Leaf decoction astringent, stops hemorrhages; taken internally for stomachache, also for kidney stones. Boiled with *Lippia alba* (q.v.) and lettuce to induce good sleep.	PLANTIJN. Not seen in Curacao.	Reportedly grown in Curacao in past for medicinal use (2).
Polypodium aureum L. POLYPODIACEAE	POLIPOL	Hairy rhizome boiled and decoction taken internally for kidney ailments.	LISUMBEIN	Found only at the top of Christoffelberg (3). No known use.
Porophyllum ruderale Cass. COMPOSITAE	GUACAMAYA	Plant decoction taken internally for stomach distress. Popular. Some people reject because of strong odor.	Not in Curacao.	*Porophyllum macrocephalum* DC. (MAMPURITU) is a popular tea and general remedy.
Psidium guajava L. MYRTACEAE	GUAYABA	Green fruit very astringent; decoction taken internally to halt diarrhea. Popular.	GUYABA; GUAVA	Young, green fruit boiled and "tea" drunk to stop diarrhea.
Rosmarinus officinalis L. LABIATAE	ROMERO	Plant decoction taken internally to calm nerves; also used externally. Plant used to season food, especially chicken.	Not in Curacao.	——
Roupala mollis Pittier PROTEACEAE	MAPURITE	Leaf decoction internally as remedy for grippe.	Not in Curacao.	——
Ruellia tuberosa L. ACANTHA-	ESCOPETILLA	Decoction of plant and roots	SCOPET; PISTOL	Leaf decoction drunk by preg-

* In eastern Venezuela, this name is applied to *Lantana trifolia* L., bathing with a decoction of which is believed to bring good luck. For this reason, the plant extract has been added in manufacturing a special soap.

PRELIMINARY LIST OF FOLK-MEDICINE PLANTS OF CORO WITH NOTES ON THOSE USED ALSO IN CURACAO (Continued)

Plant Family	Coro Name	Coro Uses	Curacao Name	Curacao Uses
Ruellia tuberosa, CEAE	continued	taken internally for urinary trouble.		nant women for "cold in the body". Root decoction diuretic and aphrodisiac.
Ruta graveolens L. RUTACEAE	RUDA; RUDA DE ESPAÑA	Plant decoction internally for spasms or shock; also externally.	Not in Curacao.	——
Salvia longispicata Mart. & Gal. LABIATAE	LA LINDA SEÑORA	Plant decoction internally for stomach distress.	Not in Curacao.	——
Sambucus mexicana var. *bipinnata* Schwerin CAPRIFOLIACEAE	SAUCO	Decoction of fresh flowers internally for stomach distress, grippe, chest ailments, and to increase flow of mother's milk.	ALGUSEMA for *Sambucus* sp., probably *S. nigra*; imported.	Dried flowers purchased in pharmacy and steeped for "tea" drunk for "cooling effect".
Scoparia dulcis L. SCROPHULARIACEAE	ESCOBILLA	Plant decoction internally for headache and as general tonic; also for diarrhea.	No vernacular name. Indigenous but rare.	No known use.
Solanum nigrum L. SOLANACEAE	JERBA MORA	Decoction of plant, with green and ripe fruits, taken internally and used externally for ringworm.	MALOIDA. *S. nigrum* var. *americanum* Schulz an occasional weed. (3)	No known use.
Sporobolus virginicus Kth. GRAMINEAE	GRAMA	Dry stems (like straw) decocted and liquid taken internally for urinary irritation, kidney complaints, also used as gargle.	Not in Curacao. *S. argutus* Kth. is called BRAGADUSHI.	*S. argutus* decoction taken for fever and urinary irritation.
Tagetes erecta L. COMPOSITAE	RUDA AMARILLA	Decoction of flowering plant applied externally.	AFRIKAANTJE	Sometimes grown as a garden flower (2).
Tournefortia gnaphalodes L. BORAGINACEAE	TABACO PISCADOR	Leafy twigs decocted and liquid taken internally as a kidney remedy; also applied externally.	TABACU DI PISCADO′	Weak decoction of leafy twigs taken as "tea" for "cold in the body"; for venereal disease, for fish-poisoning and for easy delivery. Strong decoction with *Krameria ixina* (q.v.) taken as abortifacient.
Tricanthera gigantea Steud. ACANTHACEAE	NARANJILLO	Leaf decoction taken as diuretic and febrifuge. Applied externally for refreshment.	Not in Curacao.	——
Verbena littoralis HBK. VERBENACEAE	VERBENA DE CRUZ	Plant decoction taken internally for stomach distress.	Not in Curacao.	——

"The day designated as Arbor Day shall be the last Friday in April, the week in which this day falls shall be observed as the Dr. Joseph T. Rothrock Memorial Conservation Week, during which week the citizens shall be encouraged to consider through suitable activities the broader subject of the conservation of all of the natural resources from which the wealth of the Commonwealth is derived."

Approved – the 11th day of April, A.C. 1961. DAVID L. LAWRENCE, Governor. Act of the Pennsylvania General Assembly No. 29.

Joseph Trimble Rothrock

by Susan B. Blum

Joseph Rothrock (1839-1922) was a man of many talents. He made contributions of enduring value in the fields of medicine, botany, education and conservation. But his most outstanding gift, to both his own time and to future generations, proved to be his work in conservation.

Rothrock was among the first voices in the nation, and clearly the first in Pennsylvania, to direct attention to the misuse, depletion and neglect of our forestry resources. Beginning his activities in 1877, Rothrock almost single-handedly generated public recognition of the forestry problem. He warned of "a nation lapsing into the extravagance of barbarism because of the abundance of our supplies." But he was not content to be a prophet crying in – and for – the wilderness. He backed up his early educational efforts with sound, consistent activity in the political arena. It was Rothrock who brought about, in 1893, the establishment of the first Pennsylvania State Forestry Commission.

Joseph Trimble Rothrock was born in McVeytown, Mifflin County, Pennsylvania, in 1839. His father, Abraham, was a leading physician in the area. His mother, Phoebe Brinton, was a distant relative of William Darlington, a botanist of some reknown, and was herself knowledgeable in the botany of her area.

Rothrock early evinced a love of the out-of-doors which was to follow him all his life. His boyhood dream was to become an explorer, but he had enough wisdom to ground this goal in the best scientific education available at the time. He took his bachelor

Portrait of Dr. Rothrock from THE BOTANISTS OF PHILADELPHIA by John W. Harshberger, Ph.D., 1899.

This article is based on information contained in "Joseph T. Rothrock and Forest Conservation" by Susan Dudley and David R. Goddard, *Proceedings of the American Philosophical Society*, Vol. 117, No. 1, February, 1973.

degree at Harvard University where his chief mentor was Asa Gray. In 1867 he completed a medical degree at the University of Pennsylvania. Though he was for a time a practicing physician, his course of study was likely influenced by the fact that this was the only college in the University at the time to offer courses in zoology and botany.

Joseph Rothroek's years as a student, and early years as a physician in Wilkes Barre, Pennsylvania, were periodically interrupted by intervals of "poor health". Whether his affliction was truly wanderlust or malady, the fact remains that these intervals provided the "explorer" element that Rothrock had early intended for himself.

On a leave of absence from his studies at the University of Pennsylvania in 1865, Rothrock accepted an invitation from the Smithsonian Institution to join an expedition to British Columbia and Alaska. The purpose of the expedition was to establish telegraph communication with Europe via British and Russian territories in North America, across the Bering Strait and into Siberia. The Smithsonian recognized an opportunity to study and report on this little-known land, and so included botanists and natural scientists.

Rothrock, in apparent disillusionment, left the expedition before its completion. Though he produced a work on the flora of Alaska, it is believed he neither reached nor studied that territory. (His work was a compilation of already existing data.) He did produce a thesis for his medical degree, "Medical Notes from the North West", based on his first-hand observation of the physical characteristics of the North American Indian, their diseases and medical practices. This expedition, and its scientific reportage, likely influenced the United States' purchase of Alaska in 1867.

In 1873, during another interval of "poor health", Rothrock joined the U.S. Geographical Surveys West of the 100th Meridian. This expedition explored Colorado, New Mexico, Arizona, Utah, Nevada, and parts of California. Its purpose was to compile topographical information of the Southwest. Rothrock's duties as surgeon on the expedition were light, and afforded him ample time to complete what was to prove his major scientific publication. His volume, one of seven which reported on the Survey, "enumerates and generally describes 1,168 species, belonging to 637 genera, which in turn represent 104 natural orders of plants." Rothrock further states: "In the preparation of this volume I was assisted by almost every botanical specialist in the country, so that it may fairly be said that the book has been and is still considered a standard one."

Dr. Rothrock's work in the cause of forestry began publicly in 1877. Rothrock accepted in that year a position as the first Michaux Lecturer in Forestry, and continued the post until 1894. There was little public awareness in 1877 that our forests were threatened. In fact, Rothrock's first lecture, which took place at Horticultural Hall in Fairmount Park, was attended only by the janitor and two interested citizens.

Though certain individuals had early warned of the misuse of our forestry resources, our wooded lands continued to be treated with confident abuse. There was little regard for insuring future crops either by the lumber barons, or by private owners. Proper forestry management was a little-known science in this country (though it had been developed in Germany by the 1880's, as Rothrock was to find on a visit there), and public legislation on the problem was either non-existant or poorly enforced. Following the Civil War, a rapidly developing lumber industry plus a similarly increasing population led some experts to predict a timber famine by the end of the nineteenth century.

It was into this milieu of public apathy and urgent need that Rothrock spoke. His combination of scientific background, intimate knowledge of Pennsylvania's forest lands, and zeal in the cause of preservation made him a most effective spokesman. By 1886 he had inspired enough popular interest to support the founding of the Pennsylvania Forestry Association.

Rothrock's political efforts began to bear fruit in 1893, when as previously mentioned, a bill was passed which established the first Pennsylvania Forestry Commission. Rothrock was named botanist member of that commission. The bill (which Rothrock had drafted) outlined numerous areas for further study, among them: the influence of forest cover on flooding and flood control; the kind, amount, and location of commercially valuable timber in the state; the extent and effects of forest fires; measures extant to insure future timber resources and suggestions for further measures; forested land already belonging to the state and recommendations of land for purchase.

In 1895, in the First Annual Report of the Forestry Commission, six areas of approximately 1400 square miles each were recommended for purchase by the state. These lands, burnt, barren or denuded of marketable timber, were located mainly in the watersheds of the Delaware, Ohio, and Susquehanna Rivers. So positioned, their influence on the future purity and abundance of our water supply was great.

During these early years Rothrock also applied himself to the development of a "healthful public policy." State and local governments proved to be at cross purposes in the development and maintenance of timber and forest cover. As matters stood, local taxation of forested land forced owners to remove

The first class graduated from the State Forest Academy, 1906. Left to right: Messrs. Brock, Staley, Byers, Conklin, Kraft, and Avery.

timber for whatever profit eould be had, then aban-don the land to avoid further finaneial responsibility. This proeess ultimately left the loeal governments with no revenue, and robbed the land of any futurc value. Rothrock proposed that forested lands be exempt from taxation, with the state reimbursing local governments for their losses in eurrent income. When timber was removed and sold, it eeased to be of public benefit and should, at that point, be taxed.

By 1897 the State Assembly was ready to take firm legislative aetion in thc eause of forestry. That legislature provided for thc establishmcnt of a Forestry Rescrvation Commission and authorized the purehase of 40,000 aeres in the sites recommended in 1895. (This poliey of publie purehase was to eontinue and in 1923 the state owned over 1.1 million acres.) A fire warden system was initiated, with loeal eonstables responsible for their districts, and punishments instituted for those starting fires. Monies were to be provided to individuals planting trees, and forested lands wcrc partially removed from taxation. Rothrock stated: "The Lcgislature of 1897 . . . in onc session laid a solid foundation for the forest interests of the future."

Though the foundation of Pennsylvania's forestry policy had thus been laid, two suceeding cvents deserve mention.

In 1899 state tree nurseries wcre started and the policy of distributing trees to private owners was explanded. By 1923, 50,000 acres of idle land had been restored through this program.

In 1903, Rothroek's earlier reeommendations were aeted upon and the state authorized the purehase of land in Mont Alto, Franklin County. On this land was established a school – the only one of its kind – to train the foresters and fire wardens needed for state lands. This school later merged with Pennsylvania State College, keeping its Mont Alto facilities.

Rothroek remained at the head of the Forestry Commission until 1904, and was aetive in lesser eapacities until a few months bcfore his death in 1922. Despite his advaneing years, Rothroek often joined the Commission in "tramping ovcr the country, penetrating forests where there were no wagon roads, and inspecting the lands before they were purchased." (Philadelphia *Inquirer*, December 20, 1922.)

Joseph Trimble Rothrock has been honored with many mcmorials. Tablets inseribed in his honor stand in Harrisburg, West Chester, and MeVeytown. His contributions as a botanist are acknowlcdged in the naming of the genus *Rothrockia* of the family Asclepiadaeeae, and by the numerous species which also bear his name. As a tribute to his work for Pennsylvania's forests, 85,000 acres in Huntingdon, Centre and Mifflin counties bear the name, Rothrock Statc Forest.

Not the least of the memorials to Rothrock is Conscrvation Week. What he began ncarly a century ago bcars upon our time with even greater urgency. Cognizance and preservation of our natural resources must, today, be everyone's cause.

books

HOUSE PLANT IDENTIFIER by Helmut Beehtel. Sterling Publishing Co., New York. 1973. $3.95

128 HOUSEPLANTS YOU CAN GROW by Rob Herwig. Collier Books, New York. 1971. $1.50

THE NEW YORK TIMES BOOK OF HOUSE PLANTS by Joan Lee Faust. Quadrangle Books, New York. 1973. $9.95

Interest in house plants has increased during the past few years as have the number of shops to provide plants and materials. It is inevitable that there be a concomitant increase in the number of books written on how to choose and grow the right house plants. Many of these books are soft-cover and fairly inexpensive – $1.50 and up. Some are the usual hard-cover books, ranging from pocket-size to grandiose coffee-table-size – $3.95 and up.

Most are the work of an individual and sold under the author's name; but some are part of a series on gardening and landscaping. Among the latter are the series' published by the Brooklyn Botanic Garden, Time-Life Books, Sunset Press, and Pot-Pourri Press. All are generally well written, in non-technical terminology, with good illustrations in black and white or color, depending on the price of the book. They list the most commonly used house plants and also some that may not be so well-known in our area. The pictures of the not-so-well-known ones are enough to whet the desires of collectors of unusual house plants and set them off in search of the never-before-seen plant. Simple instructions on care, propagation, disease prevention, and insect eradication are included in most of these books.

Besides these indigenously produced books, something new has appeared on the house plant book scene – books written in Europe, translated into English, and distributed by American publishers. Differences in climate, in living conditions, and in plant popularity show up in these foreign-produced books. For instance, both foreign books reviewed here, *House Plant Identifier* and *128 Houseplants You Can Grow*, speak of keeping certain plants at a temperature of 45°-50° F. in winter. Except for those who have an old-fashioned unheated porch (in which case the temperature will probably be closer to freezing), Americans usually do not have rooms as cold as suggested in these books, even in these days of fuel shortages. Nor are we inclined to collect rain water for our plants as they suggest in a number of instances; if the soil in our pots has a change in pH because of the salts in tap water we are more likely to correct it by the use of an additive purchased in the garden-supply store than by collecting rain water.

Of the two foreign books reviewed here, *House Plant Identifier* is less useful, in my opinion, than *128 Houseplants You Can Grow*. The choice of plants included in any such book is, of course, a subjective one and reflects the tastes of the author. But, a book such as *House Plant Identifier* which ignores such popular American favorites as asparagus, shrimp plant, crotons, aralias, grape ivy, and Chinese evergreen, and gives only one sentence to the heart-shaped philodendron which is grown in more American homes than any other plant, is of limited value to us as a reference book. Eight pages are devoted to orchids which are not ordinary house plants here, but are grown mostly by orchid hobbyists.

Some of the plant descriptions and instructions in *House Plant Identifier* might cause disappointment to the neophyte plant grower who believed them literally – zonal geranium (*Pelargonium zonale*) rarely blooms almost year-round in the house, and florists' geranium (*P. grandiflorum*) does not bloom from spring until fall. The instructions for care of Poinsettias make it seem fairly simple to grow the colorful bracts under the usual home conditions when the culture of this plant actually requires a very exacting set of conditions usually not available at home.

In spite of the fact that this small book is called *House Plant Identifier*, there is no identification key and it is necessary to look at the picture on each page to identify a plant in hand. The plants are grouped according to botanical families but this reader could not discern any order to the succession of families.

This book, which was written in Germany, printed in Hong Kong, and distributed by British and American publishers, gives two pages to each plant – a page of text and a facing page with a colored picture. In every case where a plant has a flower, even though that plant is grown for the foliage and not for the bloom, it is the flower which is pictured. Some of the pages have a small sketch at the bottom indicating the growth habit of the entire plant, but most do not, making it impossible to tell from the picture what the entire plant looks like.

128 Houseplants You Can Grow was written and printed in Holland. The pages are larger than in the first book and contain very clear full-color pictures of four entire plants or, in some cases, groups of related plants. The text for the plants is on the facing page. Instructions for care of the plant are in a simple code the key for which appears on the inside front cover of the book. The format is pleasant and attractive, and the choice of plants seems to me to be more appropriate. Included, however, are two plants which

I could locate only in British houseplant books – Sparmannia (African Hemp Plant) which is very popular in Germany, and Rochea (in the Crassula family). There are six introductory pages of text and pictures which discuss, in general terms, the light, temperature, water and soil requirements for house plants.

It may not be true of all copies of this book, but the binding on my personal copy is coming apart after a relatively short time. But for someone who wants a quick, easy, "how to" book at $1.50, this paper-back answers the need.

The third book is American – *The New York Times Book of House Plants* – a new, complete reference book. There are introductory chapters on plant care and a calendar listing things to be done each month of the year. There follow eighty-five beautifully illustrated pages of plants – a single plant or group of related plants to a page, arranged alphabetically according to common name (with botanical name in parenthesis) or by botanical name if the plant has no common name. Beginners, and many no-longer beginners, appreciate listings by common names. It is confusing, however, to find in the appendix a listing of plants by common names paired with botanical names, only this time the common name used is different from the one in the text.

Next comes a section, without illustrations, on what is listed as "unusual plants". I do not understand why some of them – asparagus, German ivy (*Senecio mikanioides*), hydrangea, impatiens, lantana, lily-of-the-valley for forcing, Swedish ivy (*Plectranthus australis*), and string of hearts (*Ceropegia woodii*) – are classified as unusual as they are commonly grown and sold in this area.

The last section titled "Digging Deeper Into House Plants" includes chapters on light gardening, indoor and office gardens, bottle gardens, hanging plants, and topiaries. The Appendix includes a glossary, names and addresses of house plant societies, and information on where to buy plants and supplies by mail. This latter information is quite important to people who do not live near large garden centers.

This is a beautifully designed and printed book with simple instructions that are clear to the novice as well as to the more advanced grower. For someone who wanted only one book to refer to for answers to problems with houseplants, I think that *The New York Times Book of House Plants* would fill the bill.

Phyllis Simpson

Phyllis Simpson, a graduate of the Temple School of Horticulture, Ambler Campus, has taught courses on houseplants at both the Pennsylvania Horticultural Society and the Morris Arboretum.

etc...

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BULLETIN 25 (3)

The leaf prints of Joseph Breitnall, an early American horticulturalist.

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THE MORRIS ARBORETUM BULLETIN

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COVER: a page from Breitnall's folio of prints, reprinted courtesy of the Library Company of Philadelphia. Breitnall made his prints by inking fresh or dried leaves, folding them in paper, and running them through his press. The results were the exquisite duplications you see on the cover. For more on Breitnall, and other early Philadelphia horticulturalists, see *The Role of Horticulture in Colonial Philadelphia*, page 50.

EDITOR: Hui-Lin Li ASSISTANT EDITOR: Susan B. Blum

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Women, Witches, and Herbals

by Susan B. Blum

This is the season of witches, a time for the donning of tattered robes and funny black hats in a ritual whose usual outcome is a sackful of candy.

Yet those women whom we celebrate (and they were indeed women, not crippled, ignorant caricatures) were once noble keepers of their people's trust. They were the priestesses, healers, and soothsayers in the lands of northern Europe before the coming of Christianity. Their succeeding reputation was fashioned by a Church who sought to displace their influence, discredit their abilities and, in a misogynism outlined by St. Paul, confine them to cloister and hearth.

It is on the women-healer that we wish to center our attention. As witch, priestess, or "simplewoman", it was she who had the earliest working knowledge of the flora of her surroundings.

The practice of medicine is inextricably bound to a knowledge of plants, for herbs and their derivative decoctions and compounds were long people's only tool in the face of death and suffering. To a primitive people disease is the work of the forces of nature — not far from the truth. But, in the subjectivity of the primitive mind, those forces of nature became the acts of the gods, the visible workings of presumed beings. It is not surprising, therefore, that plants which counteracted the force of disease were seen as gifts of those same gods.

Those acts which had been the charge of the priestess-healer later were attributed to the evil workings of witches. Here, women call forth rain. Figure from Ulrich Molitor's *De Lamis*, Cologne, 1489.

The knowledge of plants, their prescription to certain diseases, and the actual gathering and administration were functions of the priesthood, with whom lay the interpretation of divine will and the rites of placation and expiation. Those who understood natural laws (in which range falls the action of drugs in disease) were thought to partake of the knowledge of the gods, to have a special window onto the universe.

Thus, the women healers of the peoples of northern Europe were also preistesses, a role which brought them into direct conflict with the Christian Church.

The Church issued frequent bans on the healing arts. Its official position was that disease was a trial to be endured for the edification of the soul, or a punishment for wrong-doing to be expiated by prayer and pennance. It wasn't till the establishment of univer-

sities in the twelfth century that there developed a system of medical practices that were hierarchically condoned and beknighted.

The university and the burgeoning medical enclave were proscribed areas. They exercised control over what were good and bad medical practices — and who were good and bad practitioners. Women were outlawed, even those who practiced medicine according to the current tenets of the profession. In 1322, Jacopa Felicie was tried by the Faculty of Medicine at the University of Paris. She was not found deficient in her practice of medicine (Her patients, in fact, acclaimed her skill.) She was found guilty of being a woman practicing medicine. And Madame Felicie is but one example of many.

But this is actually the end of our story. It represents a finalized form of the centuries-old struggle between Christian and pagan, male and female authority.

The reknown of the women healers of northern Europe stretches far back in time. Tacitus mentions the esteemed reputation of the German women. History records the facility of the Druid prophetesses. The Scandanavian women's skill in the making of potions was even higher in acclaim than that of the German's, and the Scandanavians erected statues to their best women healers.

GLOSSARY OF WITCHLY TERMS

DRUG: The term derives from the Teutonic word for "dried herb".

HERBAL: A shortened form of the Latin, *Liber herbalis*, "Book of Herbs".

***MATERIA MEDICA*:** materials or substances used for the composition of remedies; a general term for all substances used as curative agents in medicine.

PAGAN: The follower (or followers) of a religion other than the three which dominated the medieval world (i.e. Christianity, Judaism, and Islam). As used in this article it is not meant to imply any moral judgements.

SIMPLE: a medicinal plant; each vegetable being supposed to possess a virtue and constitute a simple remedy.

SIMPLEWOMAN: a gatherer, prescriber and administer of simples.

SOOTHSAYER: come to mean a sorceror or foreteller of the future, the term originally meant "a speaker of truths".

WITCH: derived from the Anglo-Saxon, the word applied to both male and female practitioners of magical arts.

In such martial societies as were these, the woman-healer's skill in setting fractures, righting dislocations and healing the wounds of battle were socially vital qualities. Women also treated the all-important matters of reproduction; fertility, childbirth, and gynecological ailments all fell in their domain. Women were charged with veterinary care of the tribal cattle and its milk production. Women's influence was also thought to extend to the more amorphous areas of crop production and control of the weather. It is interesting to note, and hardly accidental in occurrence, that when the female healer-priestess fell into disrepute, these areas were the ones most often charged to the witch's evil intervention: poor weather and crop failure; the falling-off of milk production by the local herds; infertility; impotency; difficulty in childbearing; and the birth of deformed children.

Centuries preceded the Church's confident displacement of the local customs and beliefs. (Some authorities maintain that the Old Religion continued in active practice till as late as the sixteenth century. See Margaret Murray's, *The God of the Witches*.) During these centuries — for the sake of this article the sixth through the twelfth — the Church's position toward the local peoples was one of conciliation, compromise and appropriation. Church doctrine was liberally interpreted to increase its local relevance; the heroes of the local pantheon were given a thin Christian veneer and shuttled into sainthood; Church holidays were arranged to appropriate the activities of local festivals.

The Church's position toward the female priestess-healer followed similar policy lines. Local goddesses with healing attributes were appropriated into the worship of the Virgin Mary or individually elevated to sainthood. The days of herb-gathering for medicinal purposes were sandwiched into the Church calendar with appropriate saintly heading. Curing practices were moved into convent and monastery. Contemporary female religious authorities were absorbed into the powerful and newly-created role of abbess.

The latter proved particularly troublesome. The Church had no genuine place for the "female priest". Mediation between the human and divine was always viewed as an exclusive male prerogative, and sacerdotal privilege was only wrested for brief periods of time in the relative chaos of the political state. It was always called back — with severe warnings and injunctions — by the male authorities. Yet these abbesses achieved much while they still believed themselves independent, powerful, and gifted with purpose.

The Church's conciliatory role toward the priestess-healer produced some rather interesting results, some of which are still with us today. Often the Church/pagan interface produced a neither-fish-nor-fowl result, a vague combination of characteristics in which

Left: Plantain from the *Herbarium of Apuleius Platonicus*. Note the serpent and scorpion. Right: Mandrake from the same text. The visual notation refers to the recommendation that Mandrake be harvested by having a dog uproot it.

old traditions still reverberated.

The harvest festival was a most important event to the agricultural people of northern Europe. (Halloween, and the supposed power of witches at this time, is a survival of old religious celebrations) For the female medic it was a time to harvest herbs for the coming year.

In Germany the festival of the Assumption of the Virgin was deliberately correlated with the harvest celebrations, "to sanctify them" according to Pope Sergius. Lina Eckenstein, in her book *Woman Under Monasticism*, quotes contemporary (1896) practices which still bore the influence of the ancient priestess-healer traditions.

> "In Bavaria the [harvest] festival sometimes goes by the name of the 'day of sacred herbs', *krauterweihtag*; near Wurzburg it is called the 'day of sacred roots', *wurzelweihtag*, or 'day of bunch-gathering', *buschelfrauentag*. In the Tyrol the 15th of August is the great day of the Virgin, *grosse frauentag*, when a collection of herbs for medicinal purposes is made. A number of days, *frauentage*, come in July and August and are now connected with the Virgin, on which herbs are collected and offered as sacred bunches either on the altar of Our Lady in church and chapel, or on hill-tops which throughout Germany are the sites of ancient woman-worship.

Many of the female saints who originated in the early centuries in the northern climes have no roots in historical persons. A little scratching of the Christian surface proves them to be personages who enjoyed local reverence, but who had little to do with Christianity. The Saints Walpurga, Odilia, Pharaildis, and Lufthildis are but four examples of many extant. Their elevation to sainthood was in the nature of a political expediency.

Of St. Walpurga more needs be said. Though she is of doubtful historical livelihood, her legend points up the paradoxical stance of the Church toward the female healer-*cum*-saint.

Legend tells us that St. Walpurga was a niece of St. Boniface, the great apostle to Germany, and came with him to Germany in 728 A.D. She is sometimes said to have been the abbess of Heidenheim, a site located between Munich and Nuremberg. Says Anna Jameson, in her *Legends of the Monastic Orders*: "Like many religious women of that time, Walpurga had studied medicine for the purpose of ministering to the poor. The cures which she performed were

laid by the people solely to the power of her prayers."

Legend goes on to tell us that at her death she was laid to rest beneath a rock. From that rock issued an oil whose curative powers were greatly praised. (Lina Eckenstein tells us that rocks, along with fountains, trees and mountain tops, were ancient sites of woman worship)

This legend may be an appropriation of the reknown of a local priestess-healer, or an exaggeration of the healing role of an early female religious. Whichever it be, the legend continues, and the paradoxes increase.

Walpurgis Nacht bears the name of this saint-healer. For those unfamiliar with the tradition, the night of April 30th was the time when the power of witches was believed to be at its height. (The first scene of Goethe's *Faust* takes place on this eve.) On the Night of Walpurga witches were said to assemble at crossroads and mountain tops where they indulged in orgies, reaffirmed their allegiance to the devil (a goat), initiated new members, and received their assignments for the coming year. Blocksberg, the highest peak of the Harz Mountains, was said to be the central site of these gatherings.

"Witches" inducing stupor by drug and enchantment. From F. M. Guazzo's *Compendium Malificarum*, Milan, 1610.

These celebrations were more likely the survival of pagan fertility cults. The first of May signaled the beginning of the growing season. As such, it was an extremely important day to the German cultivators. Contracts were made; labors of the field were planned; the good graces of nature were sought. The location, Blocksberg, figures heavily in ancient rites of sacrifice and woman worship.

Walpurga was said to have died on the 25th of February. Yet we find her influence transported to a time when the sway of the Old Religion would have been most potent. Her power, stemming as it did from an older orthodoxy, may have been set up as guardian against the forces of the Old Religion, the Church's offering of a legitimized yet kindred authority.

Church officials found herbal curing arts a trouble-some matter, encumbered as they were with the baggage of local beliefs and ritual. Yet despite intermittent papal bans the herb garden and infirmary became a part of most cloisters.

Many early female saints were credited with miraculous cures (as we have seen in the case of Walpurga). But the high esteem of the convent-healer also had a basis in sound practice. Convent hospices treated all who asked aid. Patients received healthful food and pure water; the lodgings were clean; the atmosphere restful — all in all a very salutory environment. Combined with herbal ministrations, these factors could account for many a "miraculous" cure.

Of the powerful abbesses of those early Christian days, much can be said. They relegated to themselves a religious authority unprecedented in Church history. We can only assume that their expectations were based on traditions outside the Christian order, for their actions certainly did not bring them Church approval. They held broad sway over the local populations. To judge from the frequent interdictions, they often took the administration of sacraments upon themselves. They "interfered" in the politics of the local bishoprics and more than once led armed revolts when decisions went against what they deemed just. Among them were some of the most talented (though unpraised) writers of their day. And among their number was a woman whose contribution to the history of herbal knowledge was truly unique.

St. Hildegarde of Bingen (1098-1178 A.D.) was a powerful abbess with devoted followings in both the Church and lay populations. She is known best for her books of prophecy and revelation — works which stirred interest not only in the clergy of her time but in many centuries to follow.

In her early years, before becoming the spiritual head of her own convent in 1147 A.D., she tended the sick in the infirmary of the convent at Disibodenberg. Out of this experience she wrote two books on medicine, the first *Liber Simplicis Medicinae*, the

A witches' sabbath from E. D. Hauber's *Bibliotheca sive Acta et Scripta Magica*, Vol. III, Lemgo, 1742. This portrayal illustrates many of the commonly held beliefs concerning the activities of witchly revels.

second *Liber Compositae Medicinae*. Both were written in the vernacular (German), as the nun was not proficient in Latin. The former became a widely used *materia medica*.

Liber Simplicis Medicinae set forth the simple, natural sources for medical treatment to be found in food and herbs. It lists the merits of 213 varieties of plants, as well as 55 trees, used in the treatment of disease. It enumerates 26 different precious stones used to make medicines. In encyclopedic fashion, the book also includes 68 varieties of birds, 43 species of animals, 18 reptiles, and 37 varieties of fish. (Her work is the first to properly classify the whale as a mammal.) In her discussion of metals, Hildegarde quite properly notes the poisonous effect of lead and brass, and the tonic effect of copper and iron.

Liber Simplicis Medicinae was an exceptional contribution to herbal knowledge in that it was the first *materia medica* of indigenous plants. Other herbals were based on Greek and Byzantine texts, their plants often exotic to the European practitioner. Also Hildegarde's work was, to our best knowledge, independent of all authorities but one. As such it presents an excellent example of the popular medical arts, as well as being a reflection of Hildegarde's own, practically-gained, knowledge.

Hildegarde's contribution aside, the herbal knowledge of the non-literate female healer is not well-documented. We can only infer its nature from sources extant. These include: herbals which evidence allows us to presume were in the hands of the non-literate; the writings of those whose medical knowledge was popularly gained (e.g. Hildegard); the reportage of writers of herbals who acknowledged lay sources; the undisputed action of certain drug plants indigenous to the regions in question.

One herbal which we can conjecture was in the hands of the lay population was the *Herbarium of Apuleius Platonicus*. This small but popular recipe book of medicinal cures is believed to have originated in fifth century Greece. The work was copied for centuries, and its illustrations reduced to the distorted simplifications evident in the accompanying figures.

A peculiarity of this book is that for herbs credited

with healing a bite or sting, the creature of infliction is pictured with the plant of cure. For example plantain is accompanied by a scorpion and a serpent (see figure, page 45). This form of visual notation, in which the book abounds, made its information accessible to those who could not read. As such, it may have been a resource of the local healer.

The "simplewomen" of ancient days often bore their medical knowledge into recorded history. They were consulted by herbal compilers touched with the Renaissance spirit of inquiry and objectivity. In a departure from the slavish copying of Greek and Byzantine tests, these herbalists turned their eyes to local flora, and sought to be exhaustive in listing plants and their medicinal action. Such criteria made consultation of the local woman-healer almost a necessity.

Simon Cordo of Genoa, in his thirteenth century compilation, *Synonyma Medicinae*, ". . . was not content to pore over books . . . he had gone botanizing with an old wife of Crete to learn not only the Greek names of herbs, but also their virtues". The sixteenth century iconoclast, Paracelsus, says he studied herbal remedies with a local wise woman. Rufinus, in his thirteenth century herbal, let speak all who had a first-hand knowledge of plants. Among the tales of hunters, fishermen and artists, we find stories of the prescriptions and treatments of the women of Salerno.

We know that the powerful native narcotics belladonna (*Atropa belladonna*), henbane (*Hyoscyamus niger*), and species of *Datura* formed a part of ancient pharmacopoeias. Their effects could account for many of the powers attributed to witches, and for much of the scare literature concerning pagan cults.

These narcotics can produce death. But administered in proper dosage by local healers, these drugs would have afforded patients rest, sleep, and relief from pain. In larger dosage their hallucinogenic effects may have had a religious application.

Cultures which utilize indigenous hallucinogens often connect the altered states of consciousness they produce with religious experiences. The content of such hallucinations usually follows culturally-formed expectations. If use of hallucinogens was part of the witchly revels and orgies we hear about, the cultural expectations of the participants have been lost to history. Only the outsider's view remains.

Margaret B. Krieg, in her book *Green Medicine; The Search for Plants that Heal*, reports this contemporary experiment:

> "Recently a German professor, Dr. Will-Erich Peuckert of Gottingen, mixed an unguent of belladonna, henbane, and Datura from a seventeenth century formula and rubbed it on his forehead and armpits and had colleagues do the same. They fell into a twenty-four hour sleep in which they dreamed of wild rides, frenzied dancing and other weird adventures of the type connected with medieval orgies. A pharmacological explanation for these sensations: irregular heart action when one is falling asleep produces the feeling of dropping through space. When combined with drugs which enhance this irregularity, and also cause delirium, one might well believe it possible to fly like a witch on a broomstick."

Dr. Peuckert's experience seems to have fitted quite well the descriptions of witchly rites that have come down to us and, we might venture, his own culturally-formed expectations.

Other elements of the pagan pharmacopoeia are also receiving contemporary examination. Mistletoe, much used by Druid priest and priestess, was mentioned by Plinius the Elder as effective against cancer. Contemporary research has picked up this ancient thread and is exploring its merit. Mandrake, a popular medieval cure-all, has been found to contain a chemical which positively influences female fertility. As research and the passage of time relieve us of ancient prejudice, we may better understand the priestess-healer — no longer witch, but wise woman; no longer charlatan, but healer.

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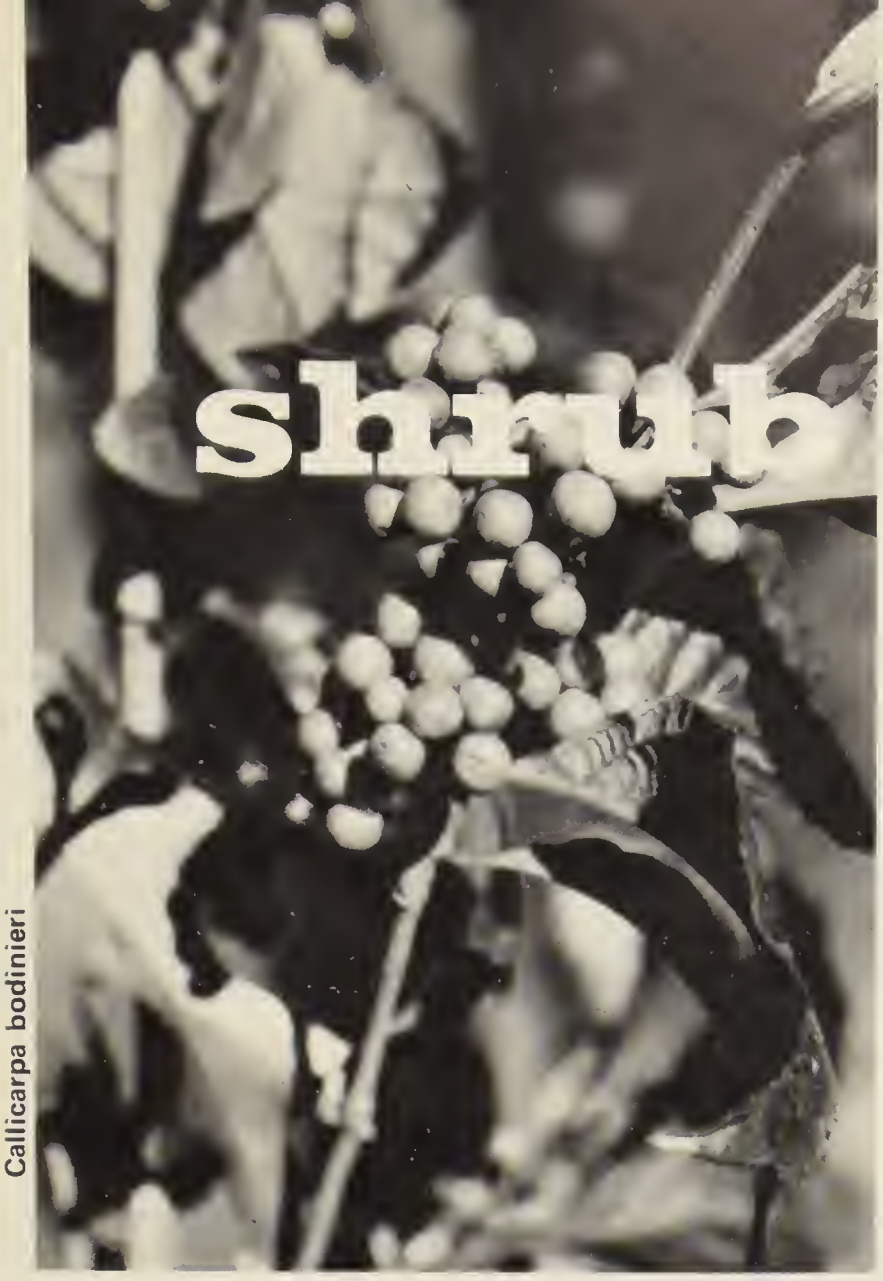

Callicarpa bodinieri

shrub profiles

CALLICARPA, A FALL GEM

By Elizabeth B. Derbyshire

Looking for a shrub with interesting fall berries? Why not consider Callicarpa, a member of the Verbenaceae, or Vervain Family.

Callicarpa comes from the two Greek words, "*kallos*" meaning beauty, and "*carpos*" meaning fruit. It is a genus primarily of the tropics or subtropics, but a few species are native to the more temperate regions of both hemispheres. The Morris Arboretum is fortunate in having a fine collection of this genus.

Callicarpas are woody shrubs with opposite simple leaves, having the late spring or summer flower clusters appearing in the axils of the leaf. The small berry-like fruits range from lilac, violet, purple, into white. Like many of the Vervain Family their half-shrubby character may cause some dying back in winter. If cut back one-third in early spring they will give good bloom and fall fruiting.

Callicarpas enjoy a well-drained loamy soil, with a moderately sunny location and some winter protection. It makes an attractive addition to the plantings of home grounds. Sometimes the berries persist through the winter months.

Propagation is best done in the spring from soft wood cuttings, placing them under a bell jar or with bottom heat. Hard wood cuttings, layering and seeds may also be successful.

The only native species, *Callicarpa americana*, growing to six feet, was named by Linnaeus in 1741, although records indicate its appearance in Virginia as early as 1680. Early botanists proposed many names: Bermudian Mulberry by Nuttall, Barbadoes Mulberry by Barton, and Rafinesque called it Somerbush. Modern authors term it French Mulberry. Early medical journals state: the "purple berries dye wool purple with alum"; the berries are "edible, sweetish and astringent"; "the leaves were useful in decoctions for dropsies."

Besides the native *Callicarpa americana*, we have many introduced species from temperate regions in eastern Asia that are hardy in our area. *Callicarpa bodinieri*, a native of China, grows to ten feet, has pinkish flowers in August, with the cluster of small fruits violet. *Callicarpa dichotoma* grows only to four feet, flowers in August, and the fruit is lilac-violet. *Callicarpa japonica*, a native of Japan and Korea, is hardy in the North, grows to five feet and has violet fruit. The variety, *leucocarpa*, produces interesting white fruits.

These are only a few of the *Callicarpa* genus which can be a welcome addition to your shrub planting. Try one, you'll like it!

Callicarpa japonica

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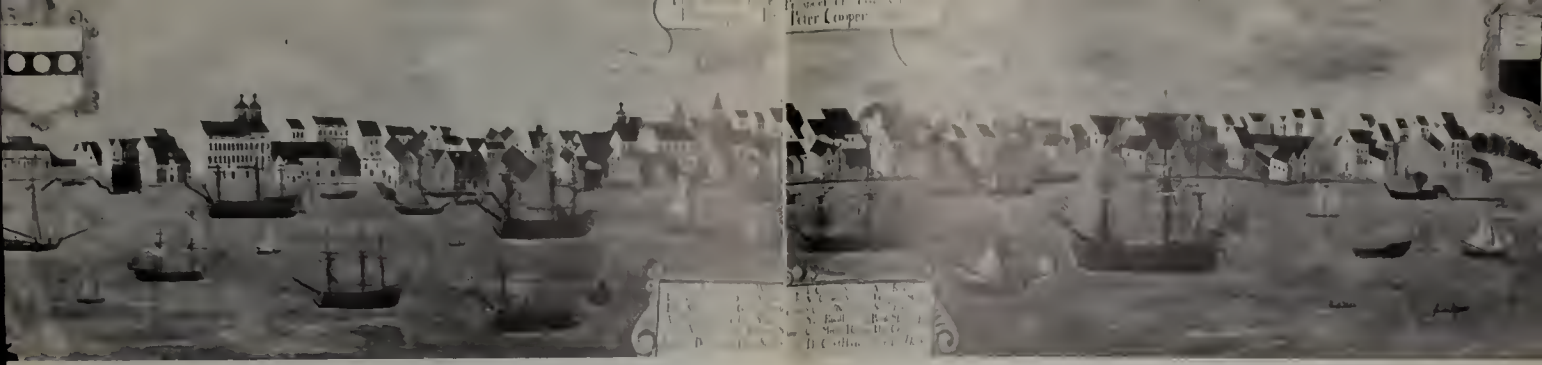

Horticulture in Colonial Philadelphia

by Elizabeth C. Walker

Pennsylvania, more particularly Philadelphia and its environs, played an important and unique role in the development of horticulture in the 18th Century on both sides of the Atlantic. One is apt to think of the South with its beautifully restored gardens, and of New England with its cottage gardens embellishing the old houses, now meccas for the tourists, as being the gardening centers of the New World. These areas, of course, had men interested in this field: Gov. Cotton Mather of Massachusetts, Dr. William Douglas of Connecticut, Gov. Cadwalader Colden of New York and his daughter, John Clayton in Virginia, Alexander Garden, Martha Logan and Dr. John Gordon in the Charleston vicinity to name a few in the earlier part of the century, with George Washington and Thomas Jefferson playing vital roles in the latter part of the century.

The temper of the new colony of Pennsylvania was rather different from the others. New England was settled by a group that believed life was meant to be hard, and the long, cold winters and generally harsh and rocky land matched their mood. In a Puritanical existence there was not much room for more than the gron necessities. New York, originally settled by the Dutch, was more interested in trade. There were early a few notable gardens but they were planted, planned and cared for by Dutch gardeners who came over from Holland and advertised their services and skill for hire in the newspapers. From Maryland southward, the colonial governors built mansions in keeping with their exalted positions and engaged gardeners to lay ont gardens in the Italianate style suitable to the climate and water supply, and the wealthy plantation owners followed suit. But these men, for the most part, were not primarily interested in horticulture. They were interested in crops of cotton, corn and tobacco – the largest yield for the least amount of effort and expenditure. The few men who were interested in the new flora worked at their hobby in lonely fashion, their contacts with people of similar interest being much confined to correspondence on the subject.

The important part that men who lived and worked in Pennsylvania played in the advancement of horticulture is attested to by the number of those whose names were given to plant species or varieties. Taking only those who were old enough before 1800 to at least begin to play some part in this field their number comes to, roughly, eighteen. If one considers those born after 1785 who had a nascent interest in botany in their youth but who did not start to contribute to the knowledge of horticulture until 1810 or '20, the figure would be higher.

Figure above: a view of Philadelphia, circa 1720, seen from the Camden side of the Delaware. Houses are keyed by number to the legend below.

Some of these men were doctors for whom a knowledge of botany was an essential part of their practice: Adam Kuhn, John Bartram, Moses Marshall, Caspar Wistar, Benjamin Smith Barton, his nephew William P. C. Barton and William Darlington. Two were ministers: Dr. Henry Muhlenberg and the Rev. Lewis David Von Schweinitz. Others were farmers: Humphrey Marshall, Lawrence Seckel, and Bartram fits into this category also. Solomon W. Conrad was a professor of botany. David Landreth, John Lyon, Bernard M'Mahon and Frederick Pursh were all professional gardeners. Then there were James Logan, who administered the colony for Penn, and Benjamin Franklin whose activities defy categorization.

Although Franklin did not personally engage in horticultural work he was ever ready to encourage and help in whatever manner he could those who displayed an interest in botany, or any other science. It was he who organized the men of knowledge and influence to form such groups as The Junta and The Society for Promoting Useful Knowledge. His *Poor Richard's Almanac*, with a circulation of some 10,000, published horticultural and agricultural hints and instructions. He is generally credited with the introduction of rhubarb, probably because of his letter to Bartram of July 9, 1769, wherein he asks him if he would like some seeds of "what appears to be the true rhubarb". It is interesting to note in this connection, however, that some ten years earlier Peter Collinson had written Bartram urging extensive growing of rhubarb and giving directions for its cooking. Thus some give Collinson credit for sending the first introduction to Bartram. But it would appear, from prints Joseph Breitnall made of various leaves, that rhubarb was already here in 1738.

The two folios of Breitnall's prints deserve mention. Breitnall was a merchant who, like so many of his contemporaries, had many interests among which were botany and printing – or engraving as he thought of it. One suspects he had tongue in cheek when he made a notation on one page, "engraved by the greatest engraver of them all". However, he need not have been modest. The prints are exquisite results of experimentation. His method was, evidently, to rub leaves, and feathers, front and back with an inked velvet or leather ball and then put them in a press between a folded sheet of newsprint. He tried this out with freshly picked and with dried leaves. In the former case the texture is revealed to perfection and every vein and stoma appear in all their delicacy.

He seemed to think nothing of traveling considerable distances to collect his leaves. One page is devoted to varieties of malva, various annual members of this family including abutilon, from Bartram's garden in 1736. He picked nasturtium in Mr. Benezet's garden on the 29th of August 1733 (the first mention noted in colonial garden literature of this perennial favorite). He went ont to the Proprietary's garden and collected numerous specimens. In 1736 he printed a page containing okra, which was primarily planted as an orna-

ment rather than an esculent. Kalm reported that the servants, however, enjoyed its fruits in soups. Some of the other plants which attracted his attention were English honeysuckle (*Xylosteum*), elecampane, which was used for veterinary purposes, white mulberry, purple flowered raspberry, melilot, ground ivy (*Nepeta hederacea*), gelder rose (*Viburnum opulus*), agrimony, moonseed, water arum (*Calla palustris*), sanicle, rabbit's foot clover, dragon root (*Arisaema dracontium*), prickly poppy (*Argemone mexicana*), the European marsh mallow (*Althaea officinalis*), catalpa (the southern *C. bignonioides*), and horseradish.

Breitnall corresponded with Peter Collinson and was largely responsible for introducing Bartram to Collinson. This English merchant was an avid plant collector and it is certain that the topic of correspondence between Breitnall and Collinson was not restricted to cloth, as one of the pages of Breitnall's prints is cut in half and bears the notation that the other half was sent to Collinson.

Pennsylvania might well have fitted into the same pattern as the other colonies had it not been that the British government owed William Penn's family a large debt.

The first settlers along the Delaware came from Sweden in 1640. Johan Printz, who talked himself and his followers out of political imprisonment with the promise of founding a "New Sweden" in the New World, brought a group over. They came ill-equipped, having no tools to speak of. Families shared an ox or a cow between them. They were soon forgotten by the motherland and were reduced to an existence not much above that of the Indians. The Dutch kept an eye on the miserable colony and, shortly after Governor Printz returned to Sweden, took over. A few English families, who found the rugged life in New England not to their liking, drifted down and settled in the area.

A leaf print by Joseph Breitnall, "the greatest engraver of them all!"

William Penn, an out-spoken Quaker, had gotten himself in trouble with the English church and government and had been in and out of prison. However, he had his champions at Court. When Charles II came to the throne Penn's friends interceded for him and in 1681 all problems were solved by Charles' granting Penn the land now encompassed by Pennsylvania and Delaware in payment of the debt due his family. When Charles heard Penn's glowing description of the territory, based on the reports of a man he had sent out to look over the country, and of the utopia Penn would found, Charles insisted that the new colony should be called Pennsylvania (Penn's Woods).

Penn and his group arrived at Newcastle on August 27, 1682. Shortly thereafter they decided that the site of their future city, Philadelphia, should be at the confluence of the Delaware River and Dock Creek, then a navigable stream with a snug harbor. At this spot were a small inn, run by an English family, called "The Blue Anchor," and a few scattered log huts inhabited by impoverished Swedes.

The homes of the settlers that first winter were caves some three feet high dug out of the river bank and shored up with logs. In some cases a crude lean-to was attached, with a roof of sod or branches and a semblance of a chimney, but generally the cooking was done at the cave entrance with wooden stakes and hooks erected to hold the pots over the fire. A few erected log cabins and some, like Anthony Morris who came a few months later, went on to Burlington, New Jersey, to stay until they had houses ready.

To encourage agriculture, which he knew was vital to success, Penn gave a city lot to every man who would undertake a farm. Soon there were 300 farms laid out around the city. The first step was, of course, to clear the land. For some reason it was thought that trees were inimical to health, hindering the free flow of air. Once the city plan was defined the settlers seem to have attacked the area with much the same attitude as the modern developer, eradicating almost every vestige of plant growth. The trees were girdled and the undergrowth burned and grubbed out. In less than a year 75 to 80 houses had been built, a number of stone with good cellars, many of brick, or heavy timber frames filled in with brick. Lime for the mortar was obtained from oyster shells. (This type of lime proved to be a good prognosticator of foul weather as a day or two before a storm the mortar would begin to drip.)

By 1685 there were 600 houses. Brick manufacture was in progress with bricks selling at 16 shillings per 1000, so brick houses were as cheap as wooden. By 1700 the population numbered 20,000. With the tremendous population growth row houses were being built and the city fathers realized the need for shade. Each inhabitant was ordered to "plant one or more

trees, viz. pines, unbearing mulberries, water poplars, lime or other shady and wholesome trees." Then as now the eity seems also to have been plagued with litter-bugs, for in 1705 it was ordered that "all land between Broad Street and the Delaware River be grub'd and eleared from all its rubbish in order to produee English grass." By 1750, although still only a mile long and half a mile wide the eity had become, in population, the seeond largest in the kingdom.

Obviously, a eity eould not grow so rapidly without an adequate food supply and without trade. A large part of the latter for export was, to begin with, in lumber. A thriving trade, for instanee, sprang up with the West Indies whieh needed various types of wood for making the easks in whieh to ship their well-known rum. The red eedar (*Juniperus virginiana*) was mueh in demand for ship building; its wood, being resistant to the vieissitudes of the weather, was found best for the hulls above the water-line. Maidenhair fern had long been used in Europe for medieinal purposes and quantities were shipped abroad as the variety found here was eonsidered even better than that native to Europe. Quantities of cranberries were preserved and shipped to Europe and the West Indies. Later juniper also figured in the eeonomy; Gottlieb Mittleberger wrote in 1754 that juniper berries sold for a high priee and that juniper was eultivated in the gardens.

William Penn,
a contemporary pastel drawing, reprinted courtesy of the Historical Society of Pennsylvania.

Even though the town houses had their small gardens of vegetables, herbs for household remedies and a few fruit trees, these eould not begin to take eare of the populaee. From the many farms elose by the eity produce was brought to the town market ou Wednesdays and Saturdays. For his own manor-farm, Pennsbury, Penn ehose a spot a few miles up the river. Here he had his all-essential vegetable and herb gardens but was particularly interested in fruit trees and native plants that would add to the well-being and eeonomy of the colony.

When starting a homestead, the first things to be planted were the fruit trees whieh, being small seedlings, needed time to grow and produce their crops which provided year-round food and drink. The gardens were planted as soon as the land was cleared. For immediate purposes, grain such as Indian corn could be planted between the girdled trees in the Indian fashion. Two men could clear 20 to 30 acres for ploughing within a year. Some accounts say a man eould clear three acres in as many months. After the vegetable and herb gardens were planted attention was turned to the house. The house-building was a community project and, with everyone helping, a log eabin would be up in a matter of a few days; a house of stone or briek in a few weeks. While in the city, with a few exceptions, the houses were built of briek, in the eountry they were largely built of the native stone often quarried from the owner's land.

The eolonists had brought with them many seeds and roots eommon to European kitehen gardens, whieh ineluded medieinal plants. Many of them so adapted to their new surroundings that they have beeome our eommon and troublesome weeds: pursland (*Portulaca oleracea*) for salads; lambsquarters (*Chenopodium album*) for salads; eurly doek (*Rumex crispus*) for salads; ehieory (*Cichorium intybus*) for drink and fodder; tansy (*Tanacetum vulgare*) used as bitters and for tea; dandelion (*Taraxacum officinale*) the root used as a drug, the leaves for salad, the flowers for wine; salsify or oyster plant (*Tragopogon porrifolius*) a vegetable. Still others, less aggressive, escaped from the garden to join our wild flower flora: wild thyme (*Thymus serpyllum*), horehound (*Marrubium vulgare*), hyssop (*Hyssopus officinalis*), savory (*Satureja hortensis*), balm (*Melissa officinalis*), wild marjoram (*Origanum vulgare*), wormwood (*Artemisia vulgaris*), caraway (*Carum carvi*).

William Penn envisioned his city as "a greene countrie towne". Each house was to stand in the center of an acre plot, whieh would eontain also the out-buildings and a garden. To further ensure the country aspeet of the town, the eity was planned in the form of a grid a mile in width and roughly two miles in length, from the Delaware to the Schuylkill, with five open areas or squares — now Washington Square, Franklin Square, the present City Hall Square then ealled "Center Square", Rittenhouse Square, and Logan Square, or Circle.

He was fortunate in his land grant from the point of view of its temperate climate and also of its topography. Geologically, the mid-Atlantic area can be

"Of artificial produce there is wheat, barley, oats, rye, peas, beans, squashes, pumpkins, watermelon, musk melons, all herbs and roots that our gardens of England usually bring forth. Divers plants that not only the Indians tell us, but we have had occasion to prove by swellings, burnings, cuts, etc. that they are of great virtue, suddenly curing the patient; and for smell, I have observed several, especially one, the wild myrtle; the others I know not what to call but are most fragrant."

Report to England by William Penn, 1683.

compared with China, which is one reason Asiatic plants thrive here, and why certain related genera are found only in these two areas. (For instance the tulip tree (*Liriodendron tulipifera*) has its Chinese counterpart in *Liriodendron chinense*.)

It is hard to envision today the area as it was when Penn arrived. The land, composed of clay mixed with sand, was hilly, cut with valleys and ravines by the numerous creeks and streams. It was dotted with ponds and morasses (the Pennsylvania equivalent of the Jersey swamps), and springs abounded. There were practically no open meadows. In the thick, largely deciduous forest oak, beech, hickory and chestnut were predominant, although Anthony Morris described his first sight of the future city in February, 1682, as "a high and dry bank next to the water, with a shore ornamented with a fine view of pines growing upon it." (By pines he more than probably referred to hemlocks which, before plants were systematized, were classed with the pines.) Peter Kalm in his account of his North American travels (1748-50) mentions two pines growing infrequently in the immediate Philadelphia area which are unexpected, – the loblolly pine (*Pinus taeda*) which he noted growing on dry, sandy heaths, and pitch pine (*Pinus rigida*) in occasional small stands "which the Pennsylvanians call the Jersey pine to distinguish it".

Society Hill in the early 1700's was really a hill whereon the skilled tradesmen who belonged to societies such as the tinsmiths, silversmiths, etc., had their homes and shops. The hill was reduced to fill in the morass and ravine created by Dock Creek and its contributing rivulets. Likewise, Spring Garden Street earned its name. It was once a road running along a fairly high bluff overlooking a stream called Peg's Run. As the Run approached the Delaware it became swampy. An early drawing shows it bounded by dikes to ward off the high-water floods. Numerous small farms and homesteads were situated along Spring Garden Street whose gardens attracted the townspeople for a diverting afternoon's drive. One of the properties also possessed a spring which was considered to have very beneficial qualities. As the city spread, the land was levelled, filled in and smoothed out.

In 1683 Penn was able to send a report back to England: "Of artificial produce there is wheat, barley, oats, rye, peas, beans, squashes, pumpkins, watermelons, musk melons, all herbs and roots that our gardens of England usually bring forth. Divers plants that not only the Indians tell us, but we have had occasion to prove by swellings, burnings, cuts, etc. that they are of great virtue, suddenly curing the patient; and for smell, I have observed several, especially one, the wild myrtle; the others I know not what to call but are most fragrant."

In 1693 Gabriel Thomas reported crops of "wheat, rye, peas, oats, barley, buckwheat, rice, Indian corn, Indian peas and beans, hamp flax." (The rice must have been the native wild rice (*Zizania aquatica*) which by 1748 was no longer considered a crop grain as the fact that the grains ripen more or less singly made the matter of harvesting it uneconomical – and, one might add, accounts for its being such a luxury item today.) Thomas also listed "turnips, potatoes, carrots, parsnips, cucumbers, squashes, cabbages, onions, radishes, pumpkins, water-melons, musk melons, artichokes, mustard [which would have been *Brassica nigra*, an Asian herb used as a condiment and for poultices, not the so-called mustard which is the plague of our farmers today], sage, mint, tansy, wormwood, pennyroyal, purslane, and most of the herbs and roots found in gardens of England." Fruits included grapes and both native and European "apples, pears, peaches, cherrys [grown also for a liquor with a taste much like that of rum or brandy], quinces, gooseberries, currents. There are also many

curious and excellent physical wild herbs, roots, and drugs of great virtue and very sanative such as sassafras, sarsparilla [*Aralia nudicaulis*], black snake root [either *Cimicifuga racemosa* or *Sanicula marilandica*], rattlesnake root [*Polygala senega*], poke root [*Phytolacca americana*]."

He does not mention Joepye weed but perhaps its use as a curative for typhoid was still restricted to New England. In that section of the country *Eupatorium purpureum* was named "Joepye" weed for an Indian medicine-man famed among his white neighbors for his skill in curing typhoid fever by means of a bitter concoction from the stems and roots of this plant. Nor does he mention bonesct (*Eupatorium perfoliatum*) which was also brewed into a tea and taken in the same manner to cure the fever which accompanied broken bones.

Thomas also reported "many faire and great Brick houses on the outside of the Towne" with gardens and orchards containing fruits, herbs, and flowers such as roses, tulips, "July flowers, sunflowers that open and shut as the sun rises and sets, carnations and many more besides abundance of medicinal plants and flowers found wild in the fields".

The potato mentioned by Thomas was not that staple of our diet today, but a native sweet potato of an inferior quality to the one we now know, hard to keep but if buried in a box of sand and stored near the fire would last for a while. The so-called Irish potato, which was taken to Europe from South America, did not become a popular part of our diet until about 1840 when the potato blight hit Ireland and horticulturalists on this side of the Atlantic began experimenting with blight resistant varieties. The root of the Jerusalem artichocke (*Helianthus tuberosus*), one of the "sunflowers" which today as then is common almost everywhere, was prized by the Indians and was as essential a part of colonial meals as the white potato is today.

Nor was the corn the sweet variety we enjoy, but field corn which could be dried and roasted. Of the latter there were many varieties, of the former about four. Sweet corn does not seem to have come into the garden until 1799 when a Capt. Sullivan brought some from the banks of the Susquehanna to New England. It was not, however, widely cultivated until the mid-nineteenth century.

Penn was equally fortunate in the men who accompanied him and who were attracted to the colony later. They realized that agriculture was basic to the success of the community and from the beginning they were fascinated by the native flora, primarily, of course, for its use as food and for medicinal remedies, but also for its beauty.

books

SEED TO CIVILIZATION: THE STORY OF MAN'S FOOD. By Charles B. Heiser, Jr. W. H. Freeman & Co., San Francisco, Cal. 1973, 243 pp. Cloth $7.50, Paper $3.50.

A few years ago there was talk of "the green revolution" and the developing of new varieties of some of our major crops gave hope of abundance of food and a world without hunger. Now, instead, we are in a time of world-wide food crisis. There is threat of famine in a number of countries and a hungry future for many people.

The survival of mankind depends on our cultivated crops, plants domesticated by our ancestors tens of thousands of years ago. They are our most important heritage. The future of mankind depends on how well we can use this legacy to help feed the ever-increasing population. The future depends on our appreciation of the importance of this legacy and our continuous efforts to best utilize and improve upon these crops. All of us can contribute to these efforts, directly or indirectly, when we have a better understanding of the background and significance of these important plants.

This timely and informative book, *Seed to Civilization: The Story of Man's Food*, gives us, in a lucid readable style, basic knowledge on food crops for the general reader. The book begins with a discussion on the origin of agriculture, the components of our diet, meat from domestic animals, cereal crops, legumes, starchy staples, coconut, and other plants for food, beverage, and spice. This account on the important crop plants is followed by an account of the evolution and breeding of man's domesticates. The book ends with an enlightening chapter on the future outlook of our food prospect.

The general discussions as well as the accounts on individual crops such as wheat, rice, maize, sugar cane, the various legumes, potato, sweet potato, manioc, yams, bread fruit, banana, etc. are all given in an interesting and yet highly accurate presentation that will be enjoyed by both the layman and the scientist alike. The many well-chosen illustrations add to the value of this book. This is a most worthy book that I would recommend to everyone who is interested in plants and our environment.

H. L. Li

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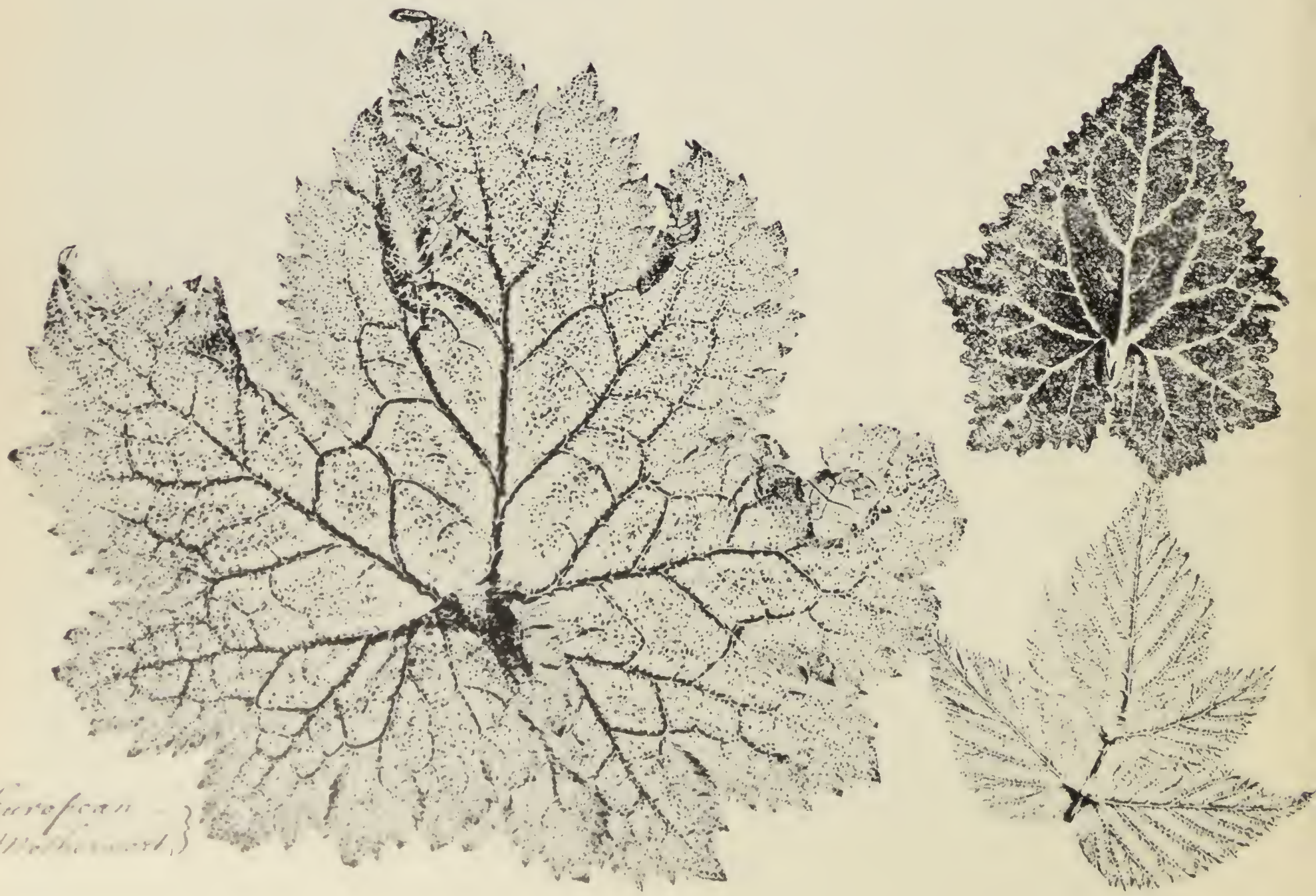

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THE MORRIS ARBORETUM BULLETIN

Volume 25 Number 4, December, 1974

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COVER: The Christmas tree can be any of several species of pine, fir, spruce and cedar. The front cover pictures clockwise, the balsam fir, *Abies balsamea*, the Austrian pine, *Pinus nigra*, the grand fir, *Abies grandis*, the Scotch pine, *Pinus sylvestris*, and the white pine, *Pinus strobus*. On the rear cover, again clockwise, are the Douglas fir, *Pseudotsuga menziesii*, the Scotch pine, the blue spruce, *Picea pungens* and the white fir, *Abies concolor*. Picture by Susan B. Blum.

EDITOR: Hui-Lin Li ASSISTANT EDITOR: Susan B. Blum

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Scotch pine

"O Christmas tree..."

Ask most people what tree has engendered their fondest memories and the answer is bound to be — the Christmas tree. The holiday evergreen is most people's most sentimental experience of tree-ness — and has been for decades.

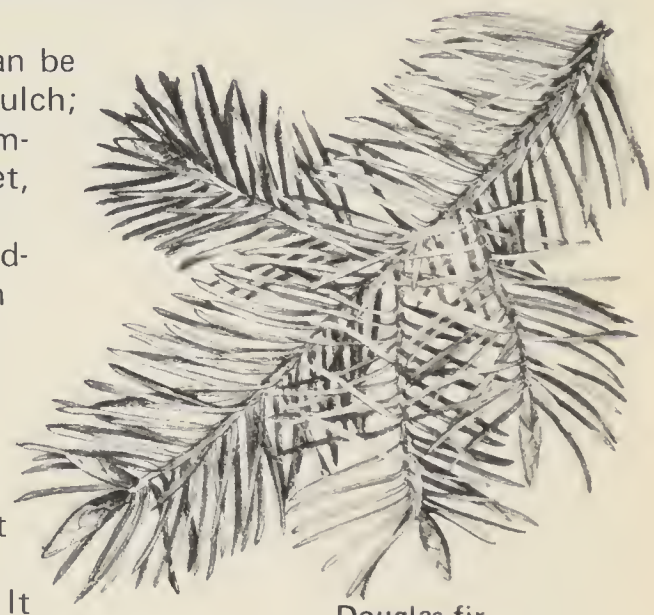
Today some 35,000,000 trees are sold during the holiday season. The most popular tree in the United States, and the most commonly purchased in our area, is the Scotch pine, *Pinus sylvestris.* It accounts for 27 percent of all Christmas trees sold. Twenty-two percent of the total are Douglas fir, *Pseudotsuga menziesii*. The Douglas fir is a native of the West Coast, and is the most commonly marketed tree in that area. The fragrant Balsam fir, *Abies balsamea*, is the popular tree of the New England and Lake states. Once cut from the wild and imported from Canada, this tree formerly dominated a third of the industry. Since 1948 that figure has dropped to 12 percent, and now reflects domestic crop trees. In the southern states, particularly the Appalachian region, the eastern red cedar, *Juniperus virginiana*, is frequently decked for the holidays.

Whichever type of tree you select for your holiday celebrations, be sure to test for freshness. A tree which will last the holiday season in your home should be sappy on the cut end, and its needles supple when bent. Also, tap the tree on the ground to test for needle-fall. A purchased tree should be stored out-of-doors, protected from sun and wind to prevent loss of moisture. When ready for use, an inch or two should be cut from the base; this newly exposed surface will allow greater water absorption. Indoors, keep the tree well supplied with water throughout the holiday period.

Having fulfilled its ornamental purpose, a Christmas tree can be almost completely re-cycled. Its needles make an excellent mulch; twigs and stem can be cut for the fireplace. Or, before dismemberment, the tree can be stood outdoors with offerings of suet, peanut butter, and seed for feathered visitors.

For those in need of an evergreen for their permanent landscape plantings, a live Christmas tree is a practical idea. Keep in mind, however, that the planting site should be prepared (that is, hole dug and filled with mulch) well before Christmas.

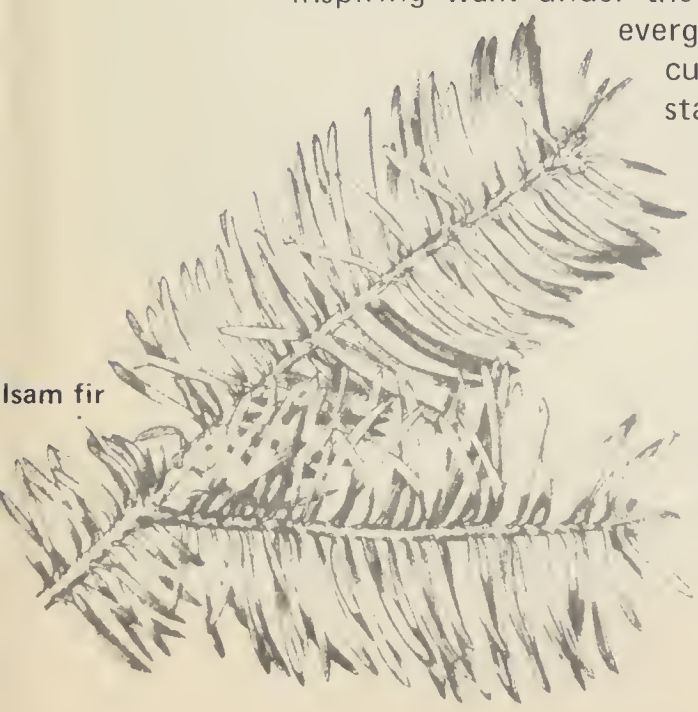
If you have been considering the purchase of an artificial tree for conservation reasons, here are some facts to consider. Christmas trees are crop trees; their yearly harvest does not deplete a natural resource. In fact, tree farming has distinct environmental advantages.



Douglas fir

Land planted with evergreens is often unfit for other crops. It is often the rocky, barren acreage problematic to the farmer. Or it is land situated where the climate is unfavorable for other agricultural products. A crop of Christmas trees prevents erosion and soil depletion, as well as creating shelter, food, and nesting space for wildlife. Harvested trees are replaced again and again, with seedlings planted in a two-to-one ratio to the number of trees expected to be gleaned. The benefits of tree farming accrue not only to the grower but to the environment as well.

The origin of an ornamented holiday tree has been variously ascribed. To duplicate an inspiring walk under the brilliant evening stars, Martin Luther supposedly brought an evergreen into his parlor and placed candles upon it (— a practice not currently recommended by the Fire Marshall). Hessian soldiers, stationed here during the American Revolution, are credited with introducing the Christmas tree to the Colonies. These lonely soldiers festooned their barracks with evergreens as a reminder of their distant home.



lsam fir

But perhaps the oldest source of this custom can be traced to the ancient mid-winter festivals of many northern European countries. For centuries the evergreen, in branch or tree, ornamented or plain, symbolized hope and endurance in the face of mid-winter bleakness. The legacy of this symbol remains for us today. The faithful branches of the evergreen still touch our lives with hope for a better, greener, more loving world.

Susan B. Blum

BOTANY

THE

BOOK

OF

FRUITS.

NEW-YORK:

STEPHEN M. CRANE, 374 PEARL STREET.

Egbert, Hovey & King, Printers.

CATECHISM

OF

BOTANY;

OR,

AN EASY INTRODUCTION TO

THE

Vegetable Kingdom:

FOR

THE USE OF SCHOOLS AND FAMILIES.

BY WILLIAM MAVOR, L. L. D.
AUTHOR OF TRAVELS, AND MANY
OTHER POPULAR WORKS.

New-York:

PUBLISHED BY SAMUEL WOOD & SONS,
NO. 261, PEARL-STREET;
And Samuel S. Wood & Co. No. 212, Market-street;
Baltimore.

1820.

in British and American Chapbooks before 1860

Emanuel D. Rudolph
Department of Botany, The Ohio State University
Columbus, Ohio

Reprinted from Plant Science Bulletin, Vol. 19, No. 3.

Very popular, cheaply produced, widely disseminated, anonymously authored, small books of the eithteenth and early nineteenth centuries termed "chapbooks" are a surprising place to find botanical information. One of the major reference works about these books begins this way, "Devils and angels, scoundrels and heroes, love and hate, murders, deathbed statements, witchcraft, riddles, tragedy, romance, song, jests, fairy tales, religion, hymns, speeches, executions, and all that goes to make up life, real and unreal, are reflected in the ephemeral chapbooks that once circulated so freely and are now so scarce." (Weiss, H. B., *A Book About Chapbooks; the People's Literature of Bygone Times,* Trenton, N.J., The Author, 1942). These books could be sold for a penny or two because they generally were made by folding a single sheet printed on both sides, with a paper cover or none, and were often copied and recopied by local printers. Chapbooks were sold by peddlers known as chapmen probably because they sold cheap or "chap" goods.

In addition to the adult fare referred to above, this book format was ideal for low-priced children's books before the period when many children's books were readily available. Less than five percent have been found to be devoted to natural history subjects for children judging from those seen by me or referred to in published works about chapbooks. Most of these are about animals in a format that has a small woodcut, often very crudely done, of an animal on the top of each page followed by a brief description. A very small number, I would estimate less than one percent, of the chapbooks consider plants. These works have become of interest to me in a study of the books that were used to initiate the young to biological information. They were a surprising place to find natural history writing.

As a group, chapbooks have a chatty and informal style that is generally lacking in the more formal books of the period. For example, in one, *Book of Fruits* (New York, S. M. Crane, n.d. [ca. 1840]), it says, "Was there ever known a little boy or girl who did not jump to take a fine orange, peach, or apple when offered? Or refuse a lemon, tamarind, pineapple, or a bunch of cherries? Very seldom I dare say. Well, here is a short history of those fruits with some others that find their way to our numerous tempting fruit stands that are so profusely dressed off near the Fulton Market, or fine showy fruit stores in Broadway or Chatham-Street. This little book will tell you many things about fruit that will be useful to you to know."

This work follows the format with cut and description for each fruit and has some unusual fruits described — mangostan, guava, and shaddock. Some chapbooks have a distinctively religious overtone, particularly those of later dates. For example, one called *The Fairy-craft of Nature* (London, Groombridge and Sons, n.d. [ca. 1850]) written in dialogue form contains the following conversation, "Lucilla: 'Thank you, dear mamma, for your pretty tale.' Mother: 'Say rather, my history, for all the changes and all the misfortunes of Flaxseed have really happened as I have related them.' Lucilla: 'What! this little seed of flax that I had in my hand just now, may become first a pretty plant, then fine thread, cambric, lint, and even paper at last?' Mother: 'Yes, my love: at the command of the Great Being who creates all

these wonders, the little seed bursts forth from the ground with its tiny green wings, which quickly expand into stems and leaves, these stems are soon adorned with pretty blue flowers, the flowers pass away . . ." Another religious approach is found in *My Flower-pot* (Concord, N.H., R. Merrill, n.d. [ca. 1840]). "Say, Ma! did God make all the flowers/ That richly bloom today?/ And is it he that sends sweet showers/ To make them look so gay?/ Did he make all mountains/ That rear their heads so high?/ And all the little fountains/ That glide so gently by?/ And does he care for children small?/ Say, Ma! does God love me?/ Has he the guardian care of all/ The various things we see?/ Yes! Yes! my child, he made them all, —/ Flowers, mountains, plants, and tree/ No man so great, no child so small,/ That from his eye can flee!"

In the category of strictly instructional chapbooks there are three common types: ABCs, object lessons, and catechisms. The ABC type uses the alphabet to instruct very young children in the letters and in words using them. *Grandmamma Easy's Pretty About Trees, Fruit and Flowers* (Boston, Brown, Bazin and Co., n.d. [ca. 1860]) uses plants from A to Z: "The A stands first in Apple Tree,/ An Apricot so sweet;/ In Acorn, too, the A you'll see./ And Almonds, nice to eat./ . . . The Z is seen in Hazel-tree/ On which nice nuts do grow;/ In Furze, also, the Z you'll see,/ And Zephyr winds that blow." Or, in *Set of Flowers Alphabetically Arranged for Little Children* (New York, S. Wood and Sons; Baltimore, S. S. Wood, 1819) each page has the name of the plant, a capital and small letter, with a picture, and very brief text from A—Aloe to W—Wall-flower, with X, Y, Z on one page having no plants or pictures.

The object lesson books attempt to instruct by telling about familiar objects in common use. In *First Steps to Knowledge. Common Things* (London, T. J. Allman, 1870, original printing 1854) the following questions and answers are found, "Q. What is cinnamon? A. The dried under bark of a tree. Q. Where are cinnamon trees found? A. In the Island of Ceylon." Quite a number of plant materials and are considered in this work including fruits, vegetables, spices, and fibers. *Rural Scenes or a Peep into the Country for Children* (Cooperstown, N.Y., H. and E. Phinney, 1839) tells children that, "Crabapples grow spontaneously in some of the woods of America, and some apples need no sugar, either in pies or puddings" and that, "Black walnut-tree wood, was once in great request, and much used in clock-cases, looking-glass frames, drawers, and other house-hold furniture; but now mahogany has driven the walnut-tree almost out of doors, as well as the solid oak." These object lessons tell us not only about how plants were used, but also about what people at that time had as their concerns.

The catechism is a format that required the memorizing of information in set answers to questions. We learn in *A Botanical Catechism: Containing Introductory Lessons for Students in Botany. By a Lady* (Northhampton, [Mass.], T. W. Shepard, 1819) that the book is addressed, ". . . to teachers as learners, preparatory to the use of 'Eaton's Manual of Botany'." It teaches the Linnaean classification as did Eaton. William Mavor's *Catechism of Botany; or, an easy introduction to the Vegetable Kingdom: for the Use of Schools and Families* (New York, S. Wood and Sons, 1820) gives the following questions and answers, "Q. Is not the knowledge of plants very useful? A. Without some knowledge of plants, we should not be able to distinguish between such as are noxious and such as are good for food, or for the various purposes of life." and, "Q. How is the knowledge of plants to be acquired? A. By the study of botany, a science which formerly implied an acquaintance with the nature, uses, and cultivation of vegetables, but which, in its modern acceptation, is applied, in the first instance, at least, to the classification of plants, or that systematic arrangement by which, from general marks or characters, the botanist is enabled to refer them to their proper place in the system. Without this, all would be confusion." The catechisms teach the definitions of plant parts and the classification of plants. C. Irving's *A Catechism of Botany; Containing a Description of the Most Familiar and Interesting Plants Arranged According to the Linnaean System. With an Appendix on the Formation of an Herbarium. Adapted to the Use of Schools in the United States* (3rd Amer. ed., New York, Collins and Hannay, 1829) also says, "Q. What advantages are derived from the study of botany? A. The study of this science as an amusement, is both healthful and pleasing, as it attracts us often into the country, and makes us acquainted with the wonderful works of nature: it also enlarges the mind, by implanting new and useful ideas, and fills it with the most exalted admiration of the great Creator of the Universe." Who then would not want to study botany?

Chapbooks provide windows for us to understand the botanical information that was generally available to large numbers of adults and children during the eighteenth and early nineteenth centuries. They also provide materials for studying the differences between the botany known by the educated and uneducated at that time and how it was presented. In the latter part of the nineteenth century these little works were replaced by more elaborate books that then became available at modest cost. It is now difficult to find these chapbooks which were either worn out or thrown away. The search for them and of their contents is well worth the effort if one is interested in the history of ideas.

shrub profiles

BERBERIS GLADWYNENSIS 'WILLIAM PENN'

by Bea & Kim Bast

The barberries are well known for their rugged beauty of fruit, flower, and foliage throughout the year. A dense, thorny growth habit has always made them useful hedges, but they are less well known as ground-cover material. The prospective purchaser need no longer be afraid of them as hosts for the black stem rust of wheat. The U.S. Department of Agriculture has long been alerted to this danger and prohibits sale of any but those varieties of barberry immune or resistant to the disease. There are many such varieties, twenty of which are listed in Wyman's *Shrubs for American Gardens.* Fortunately, the resistant barberries include many of the more useful and most highly ornamental of the species, and more continue to be discovered by horticulturalists and nurserymen, often as accidental crosses.

Just such a chance cross occurred twenty some years ago at the Henry Foundation in Gladwyn, Pa., between *Berberis verruculosa* and *B. julianae*.* To the trained eyes of botanist Josephine Henry, it was of special interest because of its growth habit. The new variety was low, more spreading than upright, and showed tremendous vigor. These facts now make the plant very desirable, for with the upsurge of interest and concern for the world of plants, more and more effort is being made to create oases of growing things in the cities. Plants which are naturally dwarf and hardy are ideal for small areas where low maintenance is required – that is, most urban planting sites.

Not long after Ms. Henry's discovery of the new barberry, she introduced it to her friend Dr. J. Franklin Styer who patented it under the name of *Berberis gladwynensis* 'William Penn'. This exceptionally hardy, low growing barberry has proven itself a valuable addition to nursery stock. In common with all its barberry relatives, it is bright with showy yellow flowers in May. In autumn some of the leaves of this essentially evergreen plant turn a bronzy red. The remainder of the leaves are year-round a dark glossy green above and whitish beneath, with tiny spines along the margins.

**Berberis* x *gladwynensis* was named by Edgar Anderson in the *Annual of the Missouri Botanical Garden*, 1953.

Gary Koller

This tough plant which rarely grows higher than three feet does exceptionally well in dry locations where little else will grow. Indeed, according to Dr. Styer, it seems to thrive in any soil, and though it prefers sun, it does very well in light shade. As if all these attributes were not enough, the William Penn has proven to be easier to transplant than many other barberry species.

This relative new-comer to the barberry clan has been used successfully in industrial plantings, on banks to prevent erosion, and is obviously a delightful addition to any rock garden or limited planting area. Fifteen such plants, a generous gift of the J. Franklin Styer Nursery, may be seen in the recent plantings of the Gates Hall entrance of the Morris Arboretum. 'William Penn' makes itself at home in California, the southwest, and Georgia, as well as in the Delaware Valley, preserving and perpetuating a great Pennsylvania name and tradition in botanical research.

Kim Bast, an Arboretum volunteer, teaches horticulture at Germantown Academy and is a part-time student at Temple University's School of Horticulture.

Bea Bast, mother of Kim and co-author of this article, is active in many horticultural endeavors, and is secretary of the Executive Board of the Morris Arboretum Associates.

MAN OCCUPIES THIS PLANET AS A GUEST OF THE PLANT KINGDOM

The title of this article was the theme of the Morris Arboretum entry in the 1974 Philadelphia Flower and Garden Show. A handsome and thought-provoking portrayal of our debt to the plant kingdom, the display won a distinguished Award of Merit.

Credit for its planning and execution must go to volunteers, Mrs. Gordon Brandes, Mrs. F.O. Haas, Mrs. William Harvey, Mrs. E. Perot Walker, and to our staff, especially Domenick DeMarco, William Graham, Ron Homeb, Gary Kuller, Albert Maher, and Gordon Brandes.

by Gordon Brandes

"Man occupies this planet as a guest of the plant kingdom — and his numbers must, in the foreseeable future, be governed by the availability of appropriate plant species."[1] Only green plants, through the miracle of photosynthesis, can capture the minute quantities of solar energy and combine the simple substances of earth and atmosphere into sugars, starches, oils, fats, proteins, fibers, vitamins and enzymes. Incapable of the miracle, men and animals become the consumers and destroyers for they can only assimilate the nutrients synthesized by plants. Human kind cannot exist without food plants, but we also rely upon many other types of plants for shelter, clothing, drugs, beverages, spices and industrial products. Even the coal and petroleum which provide our chief sources of energy as well as raw material for the vast synthetic chemical industry are derived from fossil plants.

Besides direct sustenance, plants make life amenable on this planet. They beautify and ameliorate the raw landscape, cool, modify and protect the precious mantle of soil which they in turn are largely responsible for creating. We owe an incalculable debt to that chance meeting eons ago of a few molecules of carbon, hydrogen and oxygen that led to the development of primitive forms of plant life. The plant kingdom has evolved over a period of more than three billion years. Directly or indirectly dependent on these plants, a concurrent array of animals developed ranging from the protozoa through the now-extinct dinosaurs. According to our anthropocentric viewpoint, the process has culminated in man.

Biologically, the human species is only incidental to life on this planet. It is a late comer. Were our species to disappear, so would many of its parasites, the bacteria, fungi, insects and other animals we have accommodated through selection, mutation or husbandry. There would undoubtedly be violent shifts in species populations but most life would survive. In fact, without modern man, many forms of life could flourish. Ironically, the rational animal is the only one capable of destroying life on this planet. And conversely, he is the only one who can preserve it for himself.

Throughout history the human being has been a hungry creature in search of food. Even in this age of superficial abundance the quest is more urgent than ever. Until about a decade ago the world's food productivity was increasing faster than its population rate. Recently, the trend has reversed. The Malthusian prediction of population outstripping food supply, long ridiculed by technologists, looms ominously. It seems incredible that in this enlightened scientific age more than half the world still goes to bed hungry each night. Even worse, 12,000 people die every day because they can not find enough food.

There is no world-wide surplus of food. We are fortunate in North America to produce more than twice as much grain as we consume at home. The greatest deficits, of course, occur in the least developed countries and where the population-food imbalance is accelerating most rapidly.

There is no simple and easy way out of this horribly complex dilemma. In fact, serious doubts are being raised by some that there is any real solution to the people-food equation. The intricacies of social, economic and political realities often obscure technological and scientific solutions. It is no accident that we are embroiled today in a serious struggle for control of the world's food and energy supplies. We have replaced muscle power with engines and machines. The cost and the availability of food is directly linked to the cost and availability of energy. Perhaps before the oil wells run dry we will realize that a stockpile of food is more vital to survival than a stockpile of nuclear warheads.

Most of us would like to ignore the world of politics, economics, pollution, war and hunger, but we cannot — that is the real world. It is elementary that we balance our population and food supplies, eliminate the waste of war, reduce pollution and conserve our diminishing natural resources. We may farm the sea, raise fish in ponds, even synthesize proteins from petroleum, but if there is any real hope for feeding the world's population on this planet in the years to come, highest priority must go to maintaining our base of arable soil. Life sustaining plants are our most important renewable resource. We must exercise greater wisdom in nurturing and managing them in the years to come. William Flemmer III, stated it so well, "The forester, the wise farmer and the gardener are the real heroes. They alone replace what others consume."[2]

[1]Stakman, E.C., Harrar, J.G. *Principles of Plant Pathology*. Ronald Press, New York. 1957.

[2]Flemmer, Wm. III, *Saturez' Guide to Successful Gardening*. Thos. Y. Crowell, New York. 1972.

Three spores of the Azalea Petal Blight fungus were found perching on the clutches of their own fungal parasite, on the flower surface. The slender branches of the parasite have attached to seven of the now collapsed spores with a special penetration apparatus. The single remaining healthy spore will soon be next. Increased knowledge of this microbial warfare will give science another weapon in the fight against plant disease

WARFARE in the PHYLLOSPHERE

by Patricia Allison

It is difficult to imagine as a community the grand assemblage of organisms that carry on business on or near the aerial surfaces of plants. This community is the fantastic phyllosphere — a continuum of microenvironments that clothes the plant like a transparent, patterned blanket a few millimeters thick.

The tiny habitats of the phyllosphere are incredibly endowed with useful products of diverse origins. Plants are quite leaky despite their waxy or corky covers. This permits the loss of sugars, amino acids, vitamins, minerals, growth promoters, growth inhibitors, and water. Then too, enrichment comes from the sky in the form of mineral dust and microsized organic debris. Added to these are the contributions from the various inhabitants of the immature world, such as feces, molted cuticles, and corpses. The many minute sources of food, water, and minerals support a great many different kinds of life.

Some of the members of the phyllosphere are casual visitors; others, residents. What are these organisms? There are animals: insects and mites of diverse sorts predominate, although nematodes are not at all uncommon. (It would be a little absurd to consider the cattle standing in the pasture or the squirrels and birds in the tree tops as members of the phyllosphere even though they have great impact upon life at the surface.) The population of animals associated with flower surfaces has a somewhat different composition from the population of foliage areas. Among the visiting non-residents are the essential pollinators, and among the residents, the tiny thrips. On the leaf and stem surfaces are the prolific mites, the stolid scales, and the herds of aphids. But animals are not the only inhabitants.

There are bacteria by the billions. There are fungi of radically different kinds, from single-celled forms and yeasts to filamentous ones. There are even green plants in the phyllosphere — green plants in our temperate region the algae predominate. Together the assorted green and non-green non-animals are referred to as the flora of the phyllosphere (phylloflora).

We now know that many of this throng of creatures in the phyllosphere are neither beneficial inhabitants nor neutral sites. Certain species favor one another, certain species battle one another.

In the past, we came closest to recognizing battles in the phyllosphere when trouble came in the form of a pest insect, a pest spider, or a pest fungus, all of which established themselves in our minds in a negative way because they seemed to win out in one-to-one combat with our favored plant. But the array of influential beings at the plant surface is far more complicated, far more subtle than we once thought. Simple one-to-one relationships are probably rare, if they exist at all.

Even the plant pests have their own pests or their own champions. Consider the bacteria on bean plants. Certain ones harm the plant not at all, yet are in intimate association with it — accompanying the seed, spreading over the seedling, roots and all, clothing the adult. Other bacteria associated with the bean plant can cause serious disease of the bean foliage. Most of the "unimportant" types of bacteria actually inhibit the activity of the harmful, pathogenic ones! These we would like to encourage. Yet another kind of so-called "unimportant" bacterium, harmless in itself, may be associated with the selfsame bacterial enemy of bean plants. Combined they cause far more damage than the well known pathogen can do alone.

Members of the phylloflora also accompany specialized insect associates. We need think only of the sooty molds that never fail to accompany heavy infestations of sucking insects upon whose sugary excrement they flourish. These fungi can be so abundant that the temperature and lighting of the leaf are drastically altered. They may also be deadly to the sucking insects if they become dirtied with their own excrement.

There are numerous wars between members of the phyllosphere fauna. Bands of predacious mites attack mites dependent on plant juices, a process we would like to encourage.

Similarly, some fungi that cause disease of green plants have their own fungal parasites. These "hyperparasites" have serious problems to solve even before grappling with their adversaries: they must locate and get to the target. Sometimes they grow toward the other fungus because the victim exudes special chemicals. Sometimes the parasite does this itself, and the victim is lured to its destruction.

Whether or not one pathogen is significantly damaging to another depends upon more than mere encounter. Warfare of all sorts is influenced by the nutrition of the antagonists, and by elements of the microclimates. Just as the disease susceptibility of our green plants can vary with the cultural conditions they experience, so also does the fate of the minuture warriors depend upon the external conditions during their growth.

Plant pathologists are becoming increasingly interested in studying the interlocking relationships of the living and non-living world at the plant surface in hopes of manipulating them in such a way that the green plant is favored. Such studies will be especially beneficial in our understanding and controlling health problems of the long-lived perennial woody plants. Students of the rhizosphere — that populous dynamic region next to the roots — have already taught us to use microorganisms to improve the health of trees. Now more and more attention is being directed to the aboveground living sheath in hopes of aiding our minuscule, silent allies in their battles.

books

THE COMPLEAT NATURALIST: A LIFE OF LINNAEUS. Wilfred Blunt. The Viking Press, New York. 1971. $14.95.

More has been written about Carl Linnaeus than any botanist of the last two centuries, yet very little of this vast outpouring, much of it his own work, has been made available to us until recently. He did indeed initiate modern botany, but because his personal scripts were scrawled in a combination of Latin and Swedish, they have resisted translation except by the most persistent scholars.

Now Wilfred Blunt, who many may remember gave us in 1950 that marvelous book, *The Art of Botanical Illustration*, has taken up the cause of Linnaeus. In *The Compleat Naturalist* he has produced the biography this great Swede deserves. The book has been magnificently designed, crammed with illustrations of every description (drawn from the great libraries, museums, and private collections of original botanical work located primarily in London), perfectly reproduced — the sort of book, rare these days, that is both definitive and enjoyable.

Throughout his 71 years, he wrote so prodigiously — not only records of all he observed in distant lands; at one time when he was only 26 he already had thirteen manuscripts in some degree of completion, and toward the end of his life had revised his autobiography five times — and so originally, that nothing of his went unpublished. Within ten years of his death in 1778, the Linnaean Society of London was already formed. His enthusiasm and constant wonder at God's creations were caught by his many students who were to travel around the globe to observe and collect native materials.

As the first son of Nils Linnaeus, who chose that family surname upon entry into Lund University as his version of the names of a venerated lime tree (others in the family took Lindelius and Tiliander), young Carl was expected to follow his father's profession of ordained Lutheran priest.

His father's delights were his garden and its surrounding meadows. The child was only four when he found himself developing a passion to know the names of all the flowers there. Early school did not interest him. The only respectable profession left open to him was medicine, for in those early times, around 1725, every doctor had to also be his own botanist-pharmacist. At 19, his grades in every subject that a priest needed a command of — theology, Greek, Hebrew, metaphysics, oratory — were so poor that his father was advised Carl could never become a scholar. Carpenter or tailor, perhaps, but never a priest.

Long before this, however, a sympathetic master at the Vaxjo Gymnasium, having noticed where Carl's real interests lay, assured Nils that the young man could be an excellent doctor. His father accepted this as realistic, but his mother was bitterly disappointed.

Throughout Linnaeus's life, as happens with many people of genius who have no contemporary appeal, just when all doors seemed closed to him, one would open to new vistas. To these opportunities he contributed vast energy and his own ideas as they began to take form.

His Växjö patron, Dr. Rothman, told him of the earlier work (1718) of the French botanist Sébastien Vaillant and his theory on the sexuality of plants. Linnaeus immediately recognized the validity of this and spent the summer splitting apart flowers to examine their sexual complexities. Nights went to reading every botany he could find. He soon realized that the existing nomenclature, Latinized though it might be, was in a state of total chaos. Others before him had gone as far as they could (one was Rudbeck the Younger, a patron after whom Linnaeus affectionately named the American genus, *Rudbeckia*) but had reached an impasse.

Vaillant's pioneer work was hardly known at that time. Yet by age 22, Linnaeus had already advanced his own theories on the subject as a means of classification. He presented them in a letter to Dean Celsius at Uppsala, who was impressed by this bizarre but rational technique.

Mr. Blunt's comments on the letter put it clearly: ". . . it was a dangerous step to equate the sex life of plants, with all its implications of polygamy, polyandry and incest, with that of animals; and later his 'sexual system' as expounded in his *Systema Naturae* (1735) was to earn for Linnaeus the strong disapproval of the strait-laced." In fact, as William T. Stearn explains in his long, fascinating Appendix to the book, while acknowledging that Linnaeus was a pioneer ecologist, plant-geographer, and evolutionist, he was also considered a botanical pornographer! He adds, "Erasmus Darwin, the grandfather of Charles, reduced Linnaeus's metaphorical concept to charming absurdity by personifying the genera and treating the stamens as youths, brothers, swains, husbands, and knights, the pistils as virgins, wives, and nymphs."

Be this as it may, while Linnaeus insisted upon naming a plant's *Class* by the number of its stamens and its *Order* by the female organs, he managed to produce a quick, practical method for recognizing a genus and later its species, that enabled his students,

the "apostles" of later years, to sail off intrepidly to almost every part of the world, to classify and press plant specimens on the spot, to bring back to him. One student, Daniel Solander (for whom was named *Solandra*) accompanied Captain Cook on the *Endeavor*, 1768-71. Subsequently, the British Royal Navy required a naturalist to attend every voyage. The discoveries of Linnaeus's apostles led in the next century to the work of Darwin, Huxley, and Hooker.

And well-trained naturalists they were! For among those thirteen manuscripts Linnaeus was adding to at age 26 were ones on minerals, shells, fish, insects, birds, plus a new classification for animals (he originated the name and Class of Mammals). Linnaeus's interests spanned the entire spectrum of nature's three kingdoms. While his plant Classes have since been made more truly natural, his system for designating a genus by one word, often the Latin name for the plant or animal, followed by a particular specific name that he gradually honed down from sometimes twelve words to one, remains valid. He has spared us such monstrosities as *Narcisso-Leucojum* and *Hypophyllocarpodendron.*

Inevitably, Linnaeus offended many of his peers by his complete disregard for previous names. He wanted his genera to be ". . . as short, euphonius, distinctive, and memorable as possible". Many names came from Greek and Roman mythology; others he named for botanists, friends, patrons, like *Kalmia, Fuchsia, Gardenia, Collinsonia, Celsia.*

Perhaps Linnaeus's most demanding exploration, when he was still quite young and struggling to make a living, was his first, to Lappland. He described everything that caught his interest, – the wildlife as well as the customs of the people. At the end of each exhausting day he took time to record his observations in a journal, often with strange childish sketches to augment a description. He had what is rare for a scientist, a very felicitous way with words, unabashedly poetic at times, which must account to a large extent for his hypnotic attraction to students in the near two hundred years since his death. Out of the notebook came *Flora Lapponica* several years later. Peter Collinson once invited him to come to America. He declined: he had had enough of "roughing it" in Lappland.

Linnaeus actually practiced medicine – that "acceptable profession" – for a little over a year. He did so in a desperate attempt to earn enough money to marry and his account of how he succeeded must be read to be believed. He had a wry sense of humor that, coupled with a totally objective view of human nature, soon had him so busy he had to forget his beloved botanizing for the while. When at last a medical professorship fell vacant at Uppsala, he moved there with wife and small son to spend the rest of his life.

The chore of systematizing all of nature known by the eighteenth century was a job for ten experts. Linnaeus knew this. He also knew that the consistency and sense of order of one man's eye and mind were essential, and he accepted that responsibility as if ordained by God to do so. He believed in this assignation so firmly, he inserted it into many of his manuscripts. We cannot think him vain for this: we must simply be grateful that such a man was born in such an age.

Quite necessary to this book is an explanation of how Linnaeus arrived at his various classifications. William Stearn does so, cogently, in his invaluable Appendix. To his excellent bibliography, Mr. Blunt has added a supplementary list of books (containing seventeen titles by Mr. Stearn alone); a list of Linnaeus's major works; picture acknowledgements; and an index confined to names. Only Wilfred Blunt, for many years senior master of drawing at Eton and a man of enormously varied knowledge, could have done justice to the genius of Carl Linnaeus. And so he has, with the cooperation of a most generous publisher.

Leonie Bell

ERRATA, Volume XXV, 1974

Page 5, line 35: for Peter Kahm read Peter Kalm
Page 7, in caption: for cemetary read cemetery.
Page 9, line 13: for Carex read *Carex*.
Page 9, line 13: for Rubus read *Rubus*.
Page 18: Picture credit: David Earnshaw should read Picture credit: Harold Walker.
Page 19, line 22: for southwest read southeast.
Page 35, line 6: for April, A.C. read April, A.D.
Page 46, right, line 11: for salutory read salutary.
Page 53, right, line 28: for pursland read purslane.
Page 54, right, line 20: for hamp read hemp.

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